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No. 4—The Present Position Regarding Food Inspection in England and Wales *

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Mr. H. T. Matthews, B.V.SC., F.R.C.V.S., D.V.H., was in the chair at the crowded session held on Monday afternoon, September 13th, 1948, when Mr. Thornton presented his paper, which was followed by a vigorous discussion.

The CHAIRMAN, in introducing Mr. Thornton, told Congress that two distinguished overseas guests were to take formal part in the proceedings by special invitation. As the meeting was likely to be a long one, he did not intend to take up valuable time with a lengthy introduction.

Mr. Thornton's paper was as follows:—

The position regarding meat inspection in this country calls for no self-congratulation on behalf of health authorities, for with the exception of one or two overdue legislative enactments it has shown virtually no improvement during the last 50 years. The recent war did, however, bring about a desirable change inasmuch as concentration of slaughtering was ensured by a reduction in the number of slaughterhouses from 16,000 to 512 slaughtering centres and, in this way, a greater proportion of stock slaughtered could be subjected to a routine *post-mortem* examination. It was hoped that this concentration of slaughter might provide opportunity to raise meat inspection from its empirical and unscientific basis to a level comparable to that which obtains in most Continental countries. This hope was in no way realised and, though the writer is no slavish adherent of Continental meat inspection practice and judgments, it is beyond reasonable doubt that the scientific study of meat inspection problems received more attention in Germany than in any other country in the world. Such work, as in practically all Continental countries, was vested entirely in veterinarians, and consideration of the codes of judgment obtaining in different countries elicits an incontrovertible fact, that the efficiency and scientific approach to a meat inspection service bear a direct relation to the degree in which members of the veterinary profession are employed in it.

Of recent years there have been some significant contributions, largely by Continental workers, to the various aspects of slaughter, inspection and meat hygiene, and these will be considered under the following headings:—

1. TRANSPORT, LAIRAGE AND ANTE-MORTEM INSPECTION

The control of slaughter of livestock, initiated in Britain in January, 1940, by which all animals intended for human consumption were purchased and slaughtered by the Ministry of Food, was a measure directed partly towards the avoidance of transporting livestock undue distances during the war. Even then, the livestock producer frequently complained that his cattle "lost weight and bloom" due to excessive transport or to long waiting periods before slaughter. This contention, if substantiated, has a bearing on whether or not abattoirs should be situated in the producer's or in the consumer's district, and as a return to the pre-war indiscriminate and unhygienic methods of slaughter cannot even be considered, the question of erection of abattoirs of the factory type is obviously a matter of considerable public health importance. It may therefore be opportune to examine more closely the question of depreciation of value of carcases due to excessive loss of weight, and to loss of what is known as carcase bloom.

Animals transported by rail, road or motor vehicle inevitably show a loss in live weight, *i.e.*, they weigh less at the end of the journey than the beginning. This loss in weight is partly accounted for by loss of water due to sweating and exhalation but chiefly by excretion of faeces and urine, and being influenced by various factors such as the bodily condition of the animal, the state of repletion before the journey, the duration of the journey and the season of the year, is subject to considerable variation. In an ox weighing 12 cwt. the loss in live weight is within the region of 66 to 88 lb. during the first 24 hours of the journey, but only 11 to 15 lb. on subsequent days[1]; it is a weight loss caused by excretion of waste matter and is therefore of no significance in relation to the subsequent market value of the carcase.

A more important aspect concerned with the carriage of livestock is whether unduly long periods of transport will lead to a loss in carcase weight, *i.e.*, in actual flesh. Producers are unanimous that such loss is considerable, and though this opinion is based largely on surmise and without scientific foundation it is perhaps understandable, for animals transported on long and wearying journeys undoubtedly show a marked deterioration in their external appearance.

The most valuable data on this problem has been furnished in a South African report[2] which demonstrated that fat cattle in transit for 23 to 27 hours show no loss in carcase weight although the loss in live weight is considerable and may amount to 10 per cent. of the initial weight of the animal; for journeys of duration not greater than the above period, or for distances of up to 300 miles, the loss in carcase weight may therefore be regarded as insignificant.

Subsequent to arrival at the abattoir the animal must be rested, watered, and, if the detention period in the lairage is prolonged, must be fed also. An adequate period of rest after transport is of the greatest importance, for it permits of resynthetisation of muscular glycogen and thus ensures formation of appreciable amounts of lactic acid after slaughter and a satisfactory degree of *rigor mortis*. Quite apart from macroscopic and objective signs, the carcase of an animal slaughtered immediately after prolonged and wearying transport is likely to show a persistent alkalinity of the muscle, and the marketability of the carcase is correspondingly lowered. Much of the home-killed meat at present received by the retail butchers in this country is from animals slaughtered "straight off the journey," and some of the complaints received as to the quality and palatability of the meat may undoubtedly be attributed to ignorance amongst Ministry of Food staffs as to the desirability of this pre-slaughter resting period.

The effect of unduly long transport on carcase bloom is another factor which must be considered. Carcase bloom is an important characteristic of sound meat and may be defined as the colour and general appearance presented by the surface of a carcase when viewed through the semi-transparent layers of connective tissue, muscle and fat which form the carcase surface. This bloom is lost if animals are slaughtered shortly after long periods of transport, but the aforementioned report indicates clearly that an adequate period of rest, in which animals should have free access to water, will largely obviate the harmful effect on bloom resulting from comparatively long journeys.

Animals are usually starved for 24 hours before slaughter, for it is claimed that this ensures better bleeding and that the carcase is easier to dress and has a brighter appearance; on theoretical grounds, however, there would be a case for supplying animals with a readily assimilable sugar, such as glucose or cane sugar, during the waiting period, and though the suggestion may not be justifiable on economic grounds, it would ensure complete restoration of the muscle glycogen which has become depleted by exertion.

There is little need to stress the paramount importance of routine inspection of livestock awaiting slaughter, and statistics in the United States show that 25 per cent. of animals marked as suspect on *ante-mortem* inspection are subsequently condemned. In Britain it is questionable whether 5 per cent. of animals awaiting slaughter are subjected to a routine *ante-mortem* inspection.

The value of *ante-mortem* inspection in the detection of animal diseases of the scheduled type has been repeatedly proved in Britain, particularly in connection with swine fever and foot-and-mouth disease, whilst diseases such as tetanus, or, where it exists, rabies, in which *ante-mortem* symptoms are striking but *post-mortem* lesions slight or absent, may be readily detected during the pre-slaughter examination. Of even greater importance is the value of such an examination in the detection of animals suffering from systemic

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disturbance, particularly when due to a septic cause, for meat inspection statistics have abundantly proved that the carcases of animals slaughtered while suffering from a systemic affection are the most likely to be associated with outbreaks of food poisoning in man. It is, however, an unfortunate characteristic of such affections that although the *ante-mortem* symptoms are obvious the lesions disclosed on *post-mortem* examination. especially in adult cattle and older calves[3], may be slight or absent, and if the animal has been slaughtered in the early stage of the affection the carcase may exhibit little but evidence of imperfect bleeding and a moderate degree of icterus. Animals which appear very ill on *ante-mortem* examination but which show few pathognomic lesions on *post-mortem* should therefore be regarded with the greatest suspicion, and particular care should be exercised in the judgment of calves suffering from any form of illness; in Germany these are regarded as the animals most commonly responsible for outbreaks of food poisoning. It will be apparent that an accurate *post-mortem* judgment of carcases of animals suspected to have been suffering from a systemic affection is frequently only possible by the employment of bacteriological means.

2. Routine Bacteriological Methods in the Judgment of Carcases

It is beyond question that the carcases of animals which have undergone emergency slaughter present the greatest problem to the meat inspector and are potentially the greatest menace to public health. In Germany in 1942[4] it was shown that three-quarters of the illnesses due to meat poisoning (a term used by German authorities to refer specifically to salmonella infections of the food poisoning type) were caused by emergency slaughtered animals and were responsible for 40 per cent. of the deaths. It is also significant that in Australia, where bacterial food poisoning is said to be less common than elsewhere, legislation is in force prohibiting the use of emergency slaughtered animals for human food.

Outbreaks of food poisoning due to the ingestion of certain specific bacteria with the food occur in all countries, and generally speaking, the methods by which meat becomes contaminated with these organisms are two in number:

(*a*) By secondary contamination of originally bacterially sound food. The lowering of the incidence of outbreaks due to this cause resolves itself into measures of general hygiene, including the avoidance of contamination of meat and other foods and the prohibition of undue periods of storage under unsatisfactory conditions. Admirable legislation has been adopted in Germany since 1936 in regard to the sale of mince meat and it is now illegal for such food to be prepared except on the day of sale.

(*b*) By an *intra-vitam* infection of the animal, as in the case of an animal suffering from a septicaemia due to one of the salmonellae pathogenic to man. The judgment of carcases of this type, though in some cases rendered possible by obvious *post-mortem* lesions, is aided greatly by bacteriological examination of the meat, lymph nodes, and certain of the organs, for it must be realised that symptoms or lesions which excite suspicion that the animal may be affected with a condition of a septicaemic nature are usually caused by bacteria other than those of the salmonella group. The outstanding difference between meat inspection in Britain and that which obtains in many Continental countries is that in the latter the carcases of animals suffering from certain specified affections are judged by the extensive use of bacteriological and biochemical methods, the main purpose of the bacteriological examination being to show whether salmonellae or other pathogenic bacteria are present or not in the muscular tissue or organs. In Britain, except for the occasional use of the microscope when anthrax is suspected, bacteriological methods are not employed and carcases are judged purely on the picture presented by the macroscopic lesions.

An undoubted relationship can be shown to exist between the incidence of bacteria of the salmonella type in animals and outbreaks of bacterial food poisoning in man. The commonest salmonellae associated with such outbreaks are *S. enteritidis* and *S. typhi-murium*, and of these *S. typhi-murium* is most commonly associated with outbreaks of the secondary contaminative type, while *S. enteritidis* is most commonly responsible for outbreaks due to *intra-vitam* infection of the animal destined for food. Salmonella bacteria of the food poisoning type are not infrequently found in the intestinal tract of clinically healthy animals, and though they are not natural inhabitants of the intestine it is stated by German authorities that their presence is more common than is generally supposed and should be regarded as the rule rather than the exception. Clinically healthy animals which harbour salmonellae in their intestines will excrete the organisms in the faeces, and in Germany it has been shown that certain districts are severely infested with *S. enteritidis*, which, for example, occurs mainly in the lowlands but only exceptionally in the highlands.[5] (There is need for similar research in Britain as to the incidence of salmonellae in the intestinal tract of clinically healthy domestic animals.) Infections of the salmonella type are commoner in young animals than in old or mature ones,[6] and a specific organism may give rise to illness in a variety of animal species, for few of the many types of salmonella are limited to a single host; it is known that *S. typhi-murium* occurs in nearly all species of animal, including horses, cattle, sheep, pigs, dogs, cats, rodents and birds, and *S. enteritidis* likewise occurs in a number of animal and avian hosts.[7] Rodents are considered to play an important part in the dissemination of organisms of the food poisoning type, for rats have been shown to be intermittent excretors of *S. enteritidis* over a period of at least seven weeks, while it has also been shown that the excreta of rats infected with *S. enteritidis* when held at room temperature may contain living organisms for at least 148 days.[8]

Salmonella bacteria cannot normally increase in the intestine of healthy animals, for an antagonism appears to exist between *Bacterium coli* and organisms of the salmonella type; the latter are also regarded as more susceptible to changes in the *p*H of the intestinal contents, so that in the healthy animal any salmonellae which may be present cannot increase largely in numbers. The slaughter of an animal suffering from a sporadic intestinal infection with salmonellae is, however, unlikely to lead to outbreaks of food poisoning for in such cases the bacteria are confined to the lumen of the intestines, and evisceration of the animal takes place without the intestines being opened. Such contamination of the carcase as may occur during dressing is likewise of but little significance, for the *p*H of the flesh is low and therefore inimical to bacterial growth, while the natural serous and connective tissue coverings of the carcase are an adequate protection against bacterial penetration.

On the other hand, should untoward factors arise, including exhaustion, long starvation, fever or extensive septic infection, there develops an alteration in the *p*H of the intestinal contents, with disturbance in the equilibrium of the intestinal bacterial flora, and as a result the animal turns from an occasional excretor to a constant excretor of salmonella bacteria; it is stated that even a temporary slight derangement of the intestinal functions is sufficient to bring about this change and the animal which has become a constant excretor reacts to a blood agglutination test and bacteria may even be found in the urine. Bacteria are now not only present in the intestine, but may also be found in the mesenteric lymph nodes, thence entering the lymph stream to involve the liver and gall bladder, and occasionally the kidneys and spleen; the commonest location, however, is in the gall bladder, for here bacteria encounter optimum conditions for their growth, and there is evidence that the bacterial flora of the gall bladder may be increased in number by certain untoward factors, including prolonged periods of exhaustion.[9] (The higher incidence of salmonellae in the liver or gall bladder of cattle affected with chronic liver fluke infestation has also been observed, and is attributed to the fact that saprophytic salmonellae in the intestine localise in the gall bladder, the predisposing factor being the chronic irritation set up by the parasite.[10])

Animals which are constant excretors of salmonella bacteria exhibit no *ante-mortem* symptoms and no pathognomic *post-mortem* lesions, although a slowly progressing spleen hyperplasia, due to a great increase in lymphoid and epithelioid cells, is regarded as significant.[11] Here again, such animals are rarely the cause of food poisoning, for the bacteria in the organs are few in number and the affected organs are in most cases cooked before being consumed. The greatest danger of these animals is from the veterinary public health aspect, for during life they may transmit infection to other stock, and in certain parts of Germany animals shown to be constant excretors of salmonella bacteria are slaughtered on application by the owner, or by the police authorities with the consent of the owner, and compensation is paid.

It is known that the resistance of the intestinal wall to the penetration of bacteria is decreased by the existence of any diseased condition of the bowel itself, as in acute enteritis, by the general raising of the body temperature, such as occurs in fever, or as a result of bodily exhaustion, starvation or fatigue.[12] Should an animal which is a constant excretor of salmonella be subjected to some such debilitating affection the bacteria may increase in number and in virulence, with the result that they enter the blood stream in considerable numbers and the animal shows evidence of severe systemic disturbance. Such animals may exhibit symptoms of high temperature, weak pulse, stertorous breathing and uneven distribution of body temperature, often accompanied by a severe diarrhoea which contains blood and fibrinous clots; at times the animal may be recumbent and there may be swelling of the joints and adjacent tendon sheaths. In such cases *post-mortem* examination shows the classical manifestations of septicaemia, with severe swelling and haemorrhage of the small intestine, swelling of the spleen and enlargement of the lymph nodes. In most cases not only are salmonellae found in the liver, gall bladder, kidneys, spleen and carcase lymph nodes of such animals but also in the carcase musculature, and

consumption of the flesh may give rise to outbreaks of food poisoning. Meat inspection statistics in Germany show that in emergency slaughter the most dangerous carcases are those of animals suffering from enteritis, the next most dangerous with udder inflammation, then uterus, then joints, tendon sheaths, claws hoofs, navel, lung, pleura, peritoneum, and systemic diseases following suppurative conditions or gangrenous wounds.

In many cases infections of a septicaemic nature prove fatal, but occasionally the animal may recover and a few bacteria may then be found in carcase lymph nodes, gall bladder, liver, kidneys and spleen. The animal thus becomes a carrier of salmonella bacteria, though its flesh is unlikely to be dangerous, for the causal bacteria will have disappeared from the carcase musculature.

As already stated, the commonest salmonellae encountered in the food animals are *S. enteritidis* and *S. typhi-murium*, while in calves the Dublin variety of *S. enteritidis* is regarded as the commonest in different parts of the world.[13] In Germany it was shown that when salmonellae were found in carcases bacteriologically examined, *S. enteritidis* was much the commonest and was demonstrated in 78·4 per cent. of salmonella infections, whereas *S. typhi-murium* was isolated in only 16·2 per cent. of such cases. It would therefore be a reasonable deduction to surmise that *S. enteritidis* would be the organism most frequently encountered in human cases of bacterial food poisoning. Actually the commonest salmonella type found in such cases is *S. typhi-murium*, and the relative incidence of the two types of organisms in (*a*) carcases found to contain salmonella bacteria, and (*b*) in outbreaks of food poisoning in man is shown in the following table[14]:—

	(a) Animals	(b) Man
S. typhi-murium	16·2 per cent.	60 per cent.
S. enteritidis ..	78·4 "	2·6 "

The most significant deductions can at once be made from these figures. *S. typhi-murium* is the salmonella organism most frequently observed in cases of human bacterial food poisoning because it is usually a secondary contaminant of originally bacterially sound food. On the other hand, *S. enteritidis*, though it is the salmonella type most commonly encountered in animals, is rarely implicated as a cause of food poisoning in Germany because the carcases of all animals suspected to be suffering from a salmonella infection are detained and subjected to a bacteriological examination. This procedure, made compulsory by German meat inspection law since 1923, has shown striking results, for the number of cases of food poisoning caused by consumption of the meat of diseased or emergency slaughtered animals fell from 30 per cent. of all cases of food poisoning in 1923, to 3·3 per cent. in 1937. Even the latter outbreaks could have been avoided, for in one case a lay meat inspector passed an emergency slaughtered goat as fit for food, while in the other case an emergency slaughtered cow was released before receipt of the result of the bacteriological examination.

Those countries which have adopted a routine bacteriological examination of suspected carcases prescribe in their legislation the various affections which render such an examination obligatory, and the records in Germany of the percentage of carcases detained and bacteriologically examined during the year 1936 are shown as follows:

(a) Animals slaughtered	(b) Carcases detained and bacteriologically examined	Detained carcases found to contain salmonella bacteria
Cattle 3,148,900	88,169 or 2·8 % of (a)	1,058 or 1·2 % of (b)
Calves 4,448,200	35,586 or 0·8 "	3,203 or 9·0 "
Sheep and goats 2,199,640	10,998 or 0·5 "	99 or 0·9 "
Horses .. 155,300	20,655 or 13·3 "	289 or 1·4 "

(The above table does not apply to carcases of animals which have suffered from a very severe systemic affection, for the objective lesions in the carcases of such animals, *e.g.*, imperfect bleeding, etc., were sufficient to warrant total condemnation, irrespective of whether or not salmonella bacteria were the causative agents of the affection.) The greatest value of bacteriological examination of carcases is therefore in connection with border-line cases, and carcases coming within this category are encountered daily in routine meat inspection in Britain and are usually condemned and destroyed. This procedure is obviously wasteful and unnecessary, for many carcases of this type could, if shown by bacteriological examination to contain no salmonella or other harmful bacteria, be released unconditionally for human food, or if of slightly inferior durability, for cooking prior to their release for sale.

It is frequently claimed that the incidence of food poisoning in Britain due to *intra-vitam* infection of food animals is low and that all is therefore well with the meat inspection in this country. It is, however, an incontrovertible fact that the lack of confidence in judgment of the majority of inspectors, some of them insufficiently experienced, together with the fact that no bacteriological facilities are available to assist a *post-mortem* examination, has resulted in the establishment of a very severe standard of judgment which, though it affords a maximum margin of safety, is unnecessarily wasteful. More accurate scientific methods are long overdue in the judgment of carcases, particularly in the case of emergency slaughtered animals, and it may reasonably be claimed that the general adoption in Britain of routine bacteriological methods, aided where necessary by laboratory tests of a biochemical nature, would have the effect of saving for human food more than half of the carcases suspected to be affected with septicaemic conditions and at present totally condemned.

3. Biochemical Aids in the Judgment of Carcases

Carcases which show pathological abnormality in the form of marked emaciation, anasarca, or imperfect bleeding, present little or no difficulty in judgment. Various degrees of these affections are, however, encountered and valuable aids to routine *post-mortem* examination are available in the form of simple laboratory tests, these being widely employed in abattoirs on the Continent.

For periods beyond living memory the degree of *rigor mortis*, or setting, has been judged in sides of beef by the ease with which the forelimb can be manually elevated. Absence of *rigor mortis* may be related to an oedematous condition of the animal or, on the other hand, to deficiency of muscular glycogen and a resultant sparse development of lactic acid after slaughter. This depletion of muscle glycogen and lack of *rigor mortis* may be occasioned by prolonged and wearying transport, but it may also be due to increase in the metabolic rate of the animal as a result of high fever. The flesh of healthy and rested cattle immediately after slaughter is slightly acid or slightly alkaline and shows a *p*H of 6·5 to 6·8, and sometimes up to 7·2. The flesh rapidly develops an acid reaction and in the first 48 hours of hanging shows a drop in the *p*H to 6·0, and to 5·7 after 48 hours; in sheep the average *p*H after 24 to 48 hours is 5·6 to 6·2, though in normal pigs the fall in *p*H is of lesser magnitude and is within the range of 6·2 to 6·4.[15] This constant fall in the *p*H of muscular tissue is a factor of the greatest importance in the subsequent durability of a carcase.

Having reached its lowest point the *p*H of muscular tissue remains constant for some time, this period depending on whether the carcase has been properly cooled and also on the degree of bacterial contamination and storage conditions.[16] Subsequently the *p*H rises slowly due to autolysis and bacterial growth, and when a *p*H of 6·3 is reached there is indication of incipient decomposition; it is regarded as an unfavourable indication if the *p*H of carcases of beef or mutton fails to fall to 6·1 or below within 24 hours. Thus the estimation of the *p*H of muscle in a carcase, particularly in the case of an emergency slaughtered animal, is a valuable indication as to the durability of the flesh and can be most usefully employed alone or as a complementary one to a routine bacteriological examination.

The *p*H of muscular tissue may be estimated most accurately by use of an electrometric apparatus, but for routine work in slaughterhouses wide use is made in Continental abattoirs of simple colorimetric methods which employ an indicator showing recognisable colour changes within the *p*H range of 6·0 to 7·0.[17] One of the most useful and widely used of the various colorimetric indicators is nitrazine yellow, and simple tests of this type, requiring but a small and convenient apparatus, enable the durability of a particular carcase to be estimated by an inspector during routine slaughterhouse work.

The following cases[18] show how judgment of the durability, and therefore the marketability, of a carcase can be assessed by an estimation of the *p*H of the musculature:—

	*p*H of gracilis muscle immediately after slaughter	*p*H of gracilis muscle 24 hours after slaughter
1. Cow; healthy; 7 years old ..	6·6	6·0
2. Heifer; 1½ years old; broncho-pneumonia with acute bacillary necrosis of liver and icterus. *Rigor mortis* present though animal poorly bled	6·6	6·3 Icterus still present after 24 hours
3. Bull; 11 years old; moderate condition; imperfectly bled and fractured pelvis	6·7	6·2

In Case 1 the carcase is passed for food unconditionally, whereas in Case 2 the persistence of an abnormally high *p*H after 24 hours, together with the presence of icterus, justifies total condemnation. In Case 3, the meat, though less durable than that from a healthy carcase, would be regarded in German meat inspection practice as coming within the classification of "inferior value," and prior to the war would be released for sale at a reduced price in the Freibank; In the United States zone of Germany such carcases are now consigned for immediate treatment by canning.

Consideration may also be given here to the fact that the carcases of well nourished animals affected with certain parasitic or other conditions, *e.g.*, measles of beef or pork, tuberculosis, or salmonella bacteria confined to the portal system, may be rendered safe for human food by various methods which include sterilisation by heat, pickling or freezing. The sterilisation of such carcases is an accepted procedure in Continental meat inspection practice, and in Germany carcases of this type are described as "conditionally passed" and are kept under detention until satisfactorily treated by heat or other means, when they are released for sale in the Freibank. In Britain carcases are not classified as of "inferior value," or "conditionally passed," but are either totally condemned or, after removal of the portions showing abnormality or lesions of disease, are released for food without further treatment. The desirability of the introduction of the foregoing classifications is based on the fact that it would afford a maximum public health safeguard but at the same time avoid unnecessary waste of food.

The detection of imperfect bleeding in a carcase is of importance in routine inspection, and may be due to mechanical causes, *e.g.*, suffocation, or, on the other hand, to an active hyperaemia which is the result of fever. In either case the high blood content of the carcase lowers the durability of the meat, and useful laboratory tests for the estimation of the degree of bleeding are the haemoglobin extraction test and the haemoglobin pseudo-peroxidase test.[19] These tests are simply performed, and being based on colour reaction require a minimum of apparatus and no great degree of scientific judgment.

In both France and Germany estimation of the degree of bleeding of a carcase is also made by filter-paper strips (Schleicher and Schull No. 597, Medium fine) which are introduced into a muscular incision and give an indication of the degree of bleeding.[20] In the well-bled carcase the muscular fluid does not discolour the filter paper beyond the level of its insertion, whereas in imperfectly bled carcases the filter-paper is discoloured beyond the point of its muscular insertion and is of a reddish tint. This test is also of value in the assessment of the degree of oedema of a carcase, for the serous fluid, though it does not give rise to the reddish discoloration associated with imperfect bleeding, also permeates beyond the level of insertion of the test paper.

4. The Judgment of Tuberculous Carcases.

The codes of judgment in relation to such carcases are in some cases enforceable by law, as in the German and Scottish meat regulations, while in other cases, as in England and Wales, they are simply guides as to recommended procedure. A study of the various codes adopted in different countries shows that, generally speaking, the severity of judgment extended to carcases affected with tuberculosis is in inverse proportion to the incidence of the disease in that particular country. Where the disease is prevalent a somewhat more generous judgment is accorded, and it would thus appear that these judgments are controlled in part by economics. This is obviously an untenable and unscientific attitude, for there must be general agreement that if the flesh or organs from an animal are likely to contain tubercle bacilli then the flesh or organs are unfit for human sale. It will also be agreed that the flesh or other parts of the carcase which are free, or reasonably certain to be free, from tubercle bacilli should not be destroyed but should be released for food. Carcases coming midway between these two extremes are, of course, commonly encountered in meat inspection, and thus a third classification may be considered in relation to those tuberculous carcases which are well nourished (*i.e.*, their nutritive value has in no way diminished as a result of disease), but in which there is doubt as to the complete absence of tubercle bacilli from the blood or muscular tissue. Meat regulations in certain countries recognise that such carcases may be rendered safe and perfectly fit for human food by adequate cooking of the meat before sale, and in Germany the meat of such animals is, as already stated, classified as "conditionally passed," while in the United States it is "passed for cooking." As the application of this desirable public health safeguard receives no recognition in Britain the carcases of many border-line cases of tuberculosis are destroyed.

Carcases in Britain classified as affected with generalised tuberculosis are totally condemned, as evidence of generalisation is taken to indicate that bacilli are or may be present in muscular tissue. The definition of generalised tuberculosis is laid down in England and Wales in Memo. 62/Foods, and a carcase is deemed to be so affected where there is (*a*) tuberculosis with emaciation. Amongst other criteria which are to be regarded as indicative of generalisation are (*b*) where there is miliary tuberculosis of both lungs, (*c*) where lesions are multiple, acute and actively progressive, or (*d*) where there is multiple and widespread infection of the carcase lymph nodes.

Though the codes of judgment in relation to tuberculous carcases vary widely in different countries they are in unanimous agreement that carcases which are emaciated and show evidence of tuberculosis are unfit for food and must be destroyed. There is also general agreement that where disease is classified as under (b) or (c) the bacilli are likely to be present in blood and muscular tissue, and the carcase, unless treated by heat, is therefore unfit for food.

The widest variation in the various codes of judgment obtains, however, in those cases where multiple and widespread infection of the carcase lymph nodes is found to exist, and in England, and also in Belgium, a carcase so affected is regarded as totally unfit for food irrespective of the age of the lesions. A complete divergence from this view is seen in amendments to the German meat inspection law, which became operative in 1942 and prescribes that as long as lesions of the carcase lymph nodes, no matter how widespread, are not active then the bones and lymph nodes of the carcase may be completely removed and the muscular tissue passed for food without further treatment. The reasons for this revolutionary attitude towards tuberculous carcases are based on the researches of Nieberle and his co-workers,[21] and their work lays emphasis on the qualitative rather than the quantitative characteristics of a tuberculous lesion or lesions.

The modern conception of the pathogenesis of tuberculosis, based largely on the work of Ranke in connection with the human disease, is related to the allergic resistance of the animal body which occurs as the result of a primary infection with the disease. This allergic resistance tends to act as a dam by limiting the aggressive powers of the tubercle bacilli and localising them to the site of infection. If, however, the defensive powers of the body are low the disease process may extend, with the involvement of other organs by the lympho-haemotogenous route, and should this post-primary dissemination take place, the disease may assume the form of early generalisation which may be manifested as an acute miliary tuberculosis and is often fatal. If entry of bacilli into the blood stream is of lesser magnitude, however, the disease, although it takes the form of metastatic foci in various organs, assumes a chronic or protracted form, and, provided the disease becomes quiescent or undergoes resolution, the body now enters the period of allergic resistance.

Reinfection subsequent to the period of allergic resistance may occur, but if a few bacilli "seep over the allergic dam," they give rise only to what is described as chronic organ tuberculosis; lesions of such a type take the form of chronic acino-nodular foci in the lungs, lung cavitation, or chronic tuberculosis of the udder or testis. Lesions of this type extend only by pre-existing channels and, as the lymph or blood stream does not become invaded, it is an important characteristic of chronic organ tuberculosis that the lymph nodes associated with affected organs show no lesions of disease.

Should breakdown of the allergic resistance of the body occur due to various unspecific factors, *e.g.*, exertion, adverse climatic conditions or disease, there is an increase in the sensitivity of the body with the result that the process of reinfection is now no longer arrested and the disease becomes generalised. Common manifestations of this late generalisation are seen as lesions which take the form of dry caseous masses interspersed with blood spots and with a marginal area of hyperaemia. Lesions of this type are seen as a caseous mastitis, caseous metritis, caseous nephritis, or a caseous lobular pneumonia, and they constitute the type of lesions aptly described by Nieberle as "breakdown" forms (*Niederbruchsformen*). The recognition and appreciation of the significance of the "breakdown" forms of tuberculosis are of the greatest importance in meat inspection, for it has been shown that they are the type of lesions which are likely to pour a continuous supply of bacilli into the blood stream, with the entry of numerous bacilli into the muscular tissue. An important feature of this form of tuberculosis is that although the muscle may contain very numerous bacilli the carcase lymph nodes may be unaffected, for 20 to 30 days must elapse before tuberculous lesions in the lymph nodes will become macroscopically visible. Conversely, the presence of lesions in the carcase lymph nodes is simply an indication that generalisation has occurred and, provided these lesions are not of the "breakdown" type, they should not be regarded as indicative that bacilli will be present in the muscular tissue; justification for this is based on the fact that bacilli which reach the muscular tissue will not survive longer than seven to nine days, for muscular tissue is definitely unfavourable to their existence or growth.

It will thus be apparent that if Nieberle's hypothesis is accepted, and it is supported by abundant cultural and biological tests of the muscular tissue of tuberculous animals, then a serious criticism of the code of British judgment will be at once apparent. This is that many harmless carcases, *i.e.*, those showing multiple and widespread affection of the carcase lymph nodes, are partially or, more commonly, totally condemned, while the most dangerous carcases, *i.e.*, those showing lesions of the "breakdown" type in which there is continuous or recent massive entry of bacilli into the blood stream, are frequently passed as fit for food. Thus there is need for an immediate consideration of Nieberle's work in relation to judgment of tuberculous carcases in Britain, for if his contentions are accepted it would result in the saving of the greater number of carcases which, under the present system in Britain, are totally condemned for this disease. It is significant that the radical alteration in the German meat inspection law has resulted in a fall in the number of bovine carcases totally condemned on account of tuberculosis to 15 per cent. of the condemnations of bovine carcases for all causes[22]; in most British abattoirs tuberculosis is responsible for not less than 60 per cent. of total bovine condemnations. The recognition of breakdown forms of tuberculosis is, however, a matter requiring considerable experience, skill and pathological knowledge, because signs of acute blood infection, *e.g.*, miliary or sub-miliary tubercles in lungs, kidney cortex and liver, are not obvious and may thus be easily overlooked. Any revised judgment of tuberculous carcases cannot therefore hope to fulfil its prime purpose, *i.e.*, to condemn only those carcases which are likely to be dangerous to man, unless full use is made, as it is in almost every other civilised country in the world, of the specialised training in animal pathology possessed only by the veterinary surgeon.

Summary

1. The objection of traders to centralisation of slaughter on the grounds that it would entail undue loss of carcase weight and of bloom is without scientific foundation.

2. *Ante-mortem* inspection of animals intended for human food is the exception rather than the rule in Britain, and its general adoption would greatly facilitate the detection of those animals the carcases of which are potentially dangerous to human health.

3. The adoption in Britain of routine bacteriological methods in the examination of carcases, particularly in the case of emergency slaughtered animals, would not only provide a certain and scientific means of detecting carcases which contain bacteria dangerous to man, but it would also have the effect of releasing for food many carcases which, in the absence of such facilities, are at present totally condemned.

4. The routine employment of biochemical and other tests during *post-mortem* inspection is of great value in enabling more accurate judgment to be made as to the subsequent durability of carcases. Carcases shown to be of inferior durability, or affected with certain parasitic or bacterial conditions of moderate severity, could be released for food after being subjected to efficient sterilisation by canning or other means.

5. Recent research on the pathogenesis of tuberculosis indicates that the judgments at present obtaining in Britain towards tuberculous carcases may be unnecessarily severe and responsible for the destruction of much valuable food.

6. The deplorable state of meat inspection in Britain, and the lack of scientific approach to its many problems, may be attributed almost entirely to the fact that veterinary surgeons employed on a whole-time basis have up to the present been called on to play but a minor part in the inspection of meat and other foods.

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Discussion

Procedure and Standards in the U.S.A.

Colonel **Harold E. Egan** (U.S. Army Veterinary Corps), who was the first opener of the discussion, said: I am greatly honoured to appear before this Congress as a representative of the American Veterinary Medical Association and the Veterinary Corps, United States Army. The President of the A.V.M.A. and General McCallum, Chief of the Veterinary Corps (who is also my chief), both send their greetings on behalf of the organisation they represent. (Applause.) Throughout the years the veterinary profession in America in all fields—general practice, education, research, Government activities and especially the army—have always held great admiration and respect for the professional and scientific attainments of your membership and also high regard for the scientific contributions of your men of medicine and agriculture in their studies of problems that are applicable to veterinary medicine. For instance, the work of Mr. Moran on canine hysteria, Dr. Davy's discovery of a new immunising agent in trypanosomiasis, Dr. Burkhardt's work on sterility in mares and the research in animal physiology to be undertaken at Edinburgh University all show recognition of your problems and a consistent search for solutions. Your teachings in the management of large animals have been recognised for years by the Veterinary Corps, United States Army. The very fine paper on meat inspection presented by Mr. Thornton reflects the thorough scientific approach that is part of the make-up of the men in your profession. I have a few observations on Mr. Thornton's paper that I will present at this time.

Any system of meat inspection is fundamentally dependent upon the conception of that which is considered a proper food by any particular group of people. It becomes necessary, therefore, to define spoilage of meat and to consider what is meant by spoilage. In general, we consider food spoiled which for one reason or another we do not desire to consume; and we set up standards which may be organoleptic, bacterial, chemical, or physical, whereby for each product we may determine whether or not it is spoiled. A distinction of great importance must be made between spoilage of a food and its ability to cause disease or poisoning in man. By way of example, it may be pointed out that in the Far East it is customary to consume eggs which by western standards are definitely spoiled even to containing chicks in which feather development has progressed to a considerable degree. A more common example to our own civilisation is our rejection of milk which has turned slightly sour when many of us would purchase sour milk and cheerfully consume it; we do not eat mouldy bread although it is incapable of causing illness, while mouldy cheeses find acceptance throughout the world. It is not to be denied that some foods when eaten are definitely toxic or poisonous: such foods would include those containing heavy metals as adulterants, containing pathogenic bacteria including staphylococci *Clostridium botulinum*, streptococci and many others, or toxins elaborated by staphylococci and *Clostridium botulinum*.

The fundamental object of any system of meat inspection, then, is to eliminate from man's dietary those meats capable of causing diseases or poisoning. Unfortunately, there is seldom a sharp line of distinction between the product which may be consumed without danger and the one which causes disease; however, it should be stated that from the standpoint of the bacteriologist practically all foods, even though they contain pathogens or enterotoxins, cannot cause diseases in man if they are properly cooked This is based upon the known thermal death points of bacteria and upon the heat lability of toxins. To be sure, there are notable exceptions. For example, the enterotoxins elaborated by the staphylococci are not destroyed by prolonged boiling, and neither are the spores of *Clostridium botulinum*. However, the botulinum toxin is readily destroyed by 15 minutes of boiling, as are all vegetative pathogenic organisms.

When one speaks of boiling for 15 minutes with regard to thermal death-points of vegetative organisms or destruction of toxins, it must be considered that a temperature of 100° C. must be reached in the centre of the meat mass and that, once this temperature has been achieved, it must be maintained for a period of 15 minutes. Consequently, it becomes obvious that a Skewer thermometer is of the utmost importance, and it must be remembered that the boiling point of water is not 100° C. except at sea level under normal atmospheric pressure.

Obviously, then, we arrive at a very simplified system of meat inspection which provides us with safe food even though the animal source is diseased—always remembering that the enterotoxin of staphylococcus is not destroyed. However, such a system of meat inspection, while it makes available larger quantities of meat to the consumer, is not entirely feasible, for it is obvious that meats are not

condemned only because of the possibility or probability that they can cause disease, but also for aesthetic reasons, and few of us would consider eating a well cooked, hence sterilised, tuberculous liver, because that offends our aesthetic values. We, therefore, set about to devise a series of standards promulgated as Meat Inspection Regulations, so that we may maintain our health as well as our aesthetic standards, and which yet permit us to have a moderately abundant supply of foods of animal origin. This makes it a bit more difficult to draw the line between meats or carcases that must be condemned and those that may be passed after having been adequately cooked, or those permitted to be sold freely.

Moreover, a system of meat inspection permits of multiple safeguards. Obviously, if one desired to consume raw hamburger or a partially cooked pork sausage, a serious danger of intestinal upset or trichinosis infection might exist; but if an adequate meat inspection system prevented the sale of any but freshly prepared hamburger from healthy carcases and the sale of pork from animals infected with trichinae, this danger would be obviated. We, therefore, provide in our meat inspection systems for multiple safeguards, so long as they are economically feasible.

From the foregoing, it may appear that meat inspection is a luxury. This, however, is not true because through ignorance or carelessness many persons suffer from intestinal upset, food poisoning, parasitic infections, and even death owing to unsafe meats. It is, therefore, agreed that a system of meat inspection is desirable and necessary, and the ideal system would include a sanitary control of our meats from the time the animal is born and raised through the time that it is slaughtered, and ultimately until the meat is consumed. It should include such things as the testing of livestock and the elimination of diseases transmissible to man, including tuberculosis and brucellosis in cattle; an adequate *ante-mortem* as well as *post-mortem* inspection; the control of plant sanitation including such operations as storing, freezing, boning, cooking, processing, canning, etc.; the sanitary control of transportation, refrigeration, freezing; the control of food handlers and of food-handling retailers, butcher shops, restaurants, until the ultimate point of consumption. Other factors which should be given consideration are stock-yards and abattoirs including the types of structure, where they are built, that they are rodent- and vermin-proof and possess adequate drainage, and that the nuisance of foul odours and other stock-yard and slaughterhouse nuisances be controlled.

It is obvious that every nation and every group of people cannot afford the ideal meat inspection system, and self-evidently the matter of scarcity or plenty with regard to meat and meat products is of great importance concerning the standards for condemnation, passed for cooking or sterilisation, and passed for normal consumption. In the United States, because we do not have an economy of scarcity, we may be more liberal in condemning meats, may take fewer chances, but may be ultimately more wasteful. In that regard, however, it is desirable to indicate that condemned meats are, nevertheless, utilised for the production of supplementary animal feeds and fertilisers.

In addition to *ante-mortem* examination conducted by adequately trained veterinary personnel and *post-mortem* inspection conducted by veterinarians trained in gross pathology and possessing wide experience, and assisted by lay inspectors whose training and experience is also adequate, various tests to determine the suitability of carcases for food have been suggested. Some of these are worthy of mention. In the United States, the use of microscopic pathological techniques is also employed in meat inspection to the degree that samples may be submitted to central laboratories for confirmatory diagnosis of the lesion involved.

In Germany, most slaughterhouses are equipped with bacteriological laboratories which check routinely on the edibility of suspected carcases. In this connection, there is no great problem in passing a normal carcase for food nor in condemning a badly diseased one; but the borderline case is referred to a bacteriological examination based primarily on the changes of colour of indicators in solid media. The principle upon which this depends is that meat spoilage organisms cause changes in the *p*H to occur above the neutral point. However, beyond the consideration of the expense of installing a bacteriological laboratory is the thought that meats may contain many other organisms besides those which cause spoilage or putrefaction, and which do not cause this change in *p*H; if these organisms overgrow the spoilage organisms, then, even though numerous spoilage organisms are present, there will be no change of *p*H to indicate that fact.

Another method of determining the suitability of meat for food has been the determination of the *p*H of muscle tissue by means of a *p*H-meter. This method, too, is not thoroughly reliable because autolysis as well as spoilage organisms affect the *p*H of meats, and because properly cooked meats of higher *p*H's than 6·2 to 6·5 are innocuous when consumed. The matter of taste must also be considered since some people prefer well matured and ripened meat. In preliminary testing of *p*H of meats at the Fourth Medical Laboratory, curves have been established against varying temperatures. Meats have been kept at 0° C., 10° C., room temperature, and in the 30° and 40° C. incubator. These curves differ, and while the *p*H does rise as the meat spoils, it has not been possible for us to designate a particular *p*H at which evidence of spoilage occurs consistently. In more than 50 *p*H determinations, we have had readings from 5·6 to 8·0. No anaerobic studies were made at this time, but aerobic studies including bacterial counts, coliform tests, and the determination of predominating organisms were made. Most *p*H readings were in the 5·6 to 6·6 range, and it is interesting to note that the minimum bacterial plate counts in the higher *p*H readings were lower than the maximum counts in the lowest *p*H. Aerobic spore-forming rods predominated in the earlier studies, but as the meat aged and spoiled, Gram-positive micrococci and streptococci appeared. Coliform tests were positive in only a few cases, and then only in the fresher meat. So, although Herzner and Mann, in 1926, in the *Zeitschrift fuer Untersuchung der Lebensmittel*, stated that meats showing a *p*H of 6·0 to 6·2 indicate impending putrefaction, and while Schmidt, in 1928, in the *Archiv fuer Hygiene*, considers *p*H readings above 6·3 to indicate the same thing, it, nevertheless, appears obvious from our own studies that, based solely on the change of *p*H, one cannot determine the edibility of meat or the degree of its spoilage. Under controlled conditions of slaughtering and refrigeration, the *p*H of meat may have more value; this, however, is something upon which we have not had the opportunity to do any research, for in Germany the U.S. armed forces do not slaughter animals.

The question as to whether bacteria make their first appearance in meat is one which is frequently asked, and a great deal of work has been done in an attempt to answer it. Various investigators give different figures as to the percentage of recently slaughtered animals from whose musculature organisms have been cultured. Some of these figures are: 80 per cent. of slaughtered hogs show aerobic bacteria present; 40 per cent. of slaughtered hogs show anaerobes; 30 per cent. of beef carcases show organisms present. One may enquire into the sources of these organisms. Obviously, sub-clinical septicaemic conditions may be responsible, and, in addition, it is indicated by recent studies on the "sticking" of hogs that bacteria may be introduced and may multiply in the hog and in its muscles so that numerous organisms are present. It is likewise possible that contamination through the cutting of jugular veins in the exsanguination of carcases of other classes of livestock may be a source of bacterial infection.

In summary, then, an economically feasible system of safeguards must be selected in each country as its meat inspection system. Spoiled meat does not mean meat that cannot be consumed safely; it simply means that meat which is not aesthetically acceptable to our tastes, and it depends largely upon our pocket books as to where we draw the line.

Comment and Miscellaneous Information

1. Centralisation in the meat industry should improve the meat inspection system, permitting a most rigid control of *ante-mortem*, *post-mortem*, and processing inspections. If the meat industry is centralised in the meat production area, this should result in decreased shrink and "loss of bloom." It provides a source of fertiliser, tankage, and supplementary animal protein feeds in the vicinity of their use. It is feasible and economically sound provided there are adequate storage facilities including freezing and refrigeration, and adequate refrigerated transport. Another advantage is that it permits of the best type of factory-style abattoir and stock-yards.

2. Adequate meat inspection personnel should include well-trained and highly experienced veterinary inspectors and lay inspectors. On-the-job training as well as theoretical training are both exceedingly important, but emphasis should be placed on the "on-the-job training." In order to fix the responsibility, a chain of command should exist in which the final inspector is the best qualified veterinary inspector capable of making ultimate decisions with regard to passage or condemnation of meats.

3. Control of shrink (loss of weight) of live animals is best achieved through resting and watering. Feeding is not normally economically feasible unless there is a long holding period and unless the stock can gain considerable weight and is not mature when received. In the United States, live animals may not be shipped for a longer period than 28 continuous hours without stopping for watering and resting.

4. There is a long chain in the handling of meats from the live animal to ultimate consumption, and some of the links of this chain are as follows: (*a*) slaughter, (*b*) refrigeration, (c) storage, possibly including freezing, (*d*) cutting, trimming, boning, processing, (*e*) handling and transportation, (*f*) sale to consuming agencies, (g) another period of refrigeration, (*h*) cooking, including spicing, preparation of gravies, etc., (*i*) storing of left-overs, reheating, etc. This chain may be weak in any one of its links, and at any point may result in spoilage. As a matter of opinion, the spoilage which causes food poisoning occurs because cooking is inadequate, or some time after cooking because handling of left-overs or gravies is improper.

5. Freezing of meat does not destroy toxins, but does reduce the bacterial population by approximately 90 per cent., for example:

Initial contamination:	After freezing:
1,300 organisms per gramme	150 organisms per gramme
21,400 " " "	3,000 " " "

6. Research in *p*H of meats at the Fourth Medical Laboratory:

*p*H	Bacterial Counts Minimum	Maximum
5·6	150	637,000
5·7	52,000	16,800,000
5·8	3,000	410,000
5·9	1,300	533,000
6·0	750	112,000
6·1	51.000	2,140.000
6·2	5,700	4,900,000
6·3	210,000	
6·4	1,880,000	52,000,000
6·5	127,000	Too numerous to count
6·6	300,000	" " " "

7. United States "Passed for Sterilisation" requires that the meat be cooked for 30 minutes at 170° F. (76·5° C.).

The Criteria and Disposition of Carcases and Parts with Regard to Tuberculosis

Slaughtered animals affected with tuberculosis may be (1) passed for food, (2) passed for cooking (sterilised), or (3) condemned.

In general, a carcase is "passed for food" when there are few localised lesions which do not show evidence of metastatic distribution and carcases are condemned even if there is only a reasonable possibility that they may contain tuberculous organisms or toxic substances associated with them.

Criteria for Condemnation.—Condemnation is required if there are numerous uniformly distributed tubercles in both lungs. If tubercles are present in two or more of the following organs: kidney, uterus, spleen, ovary, testicle, adrenal glands, brain, and spinal cord, or their membranes, in addition to local tuberculous lesions in the digestive or respiratory tract, the carcase will be condemned.

Criteria for U.S. "Passed for Food."—A carcase may be "passed for food," in which three groups of visceral lymph glands show lesions of tuberculosis. The lesions must be inactive, calcified, and/or encapsulated, but all of them may not occur in one body cavity. One of these groups may be replaced by cervical lymph glands which contain lesions, and/or one group may be replaced by an organ which shows slight lesions. In the latter case (when an organ is tuberculous), however, the lesions may be present only in one body cavity, or, to put it another way, if both body cavities contain tuberculous lesions, then an organ may not be involved, with the sole exception of the liver, and then only in this combination: cervical lymph glands, plus one visceral group in each body cavity, plus the liver.

Criteria for U.S. "Passed for Cooking."—In the event that a carcase does not contain tuberculous lesions which warrant condemnation, but shows a greater degree of tuberculosis than stated above for carcases which may be "passed for food," the carcase must be "passed for cooking." The following example is given: A bovine carcase which was afebrile on *ante-mortem* inspection and which shows a good state of nutrition, evidences the following lesions: (1) Two cervical lymph glands show slight calcification; (2) bronchial lymph glands show encapsulated caseous lesions; (3) hepatic lymph glands show slight calcification. Disposition: the carcase is "passed for food"; the head "passed for cooking"; the lungs are condemned, and the liver is condemned. Even if the liver contained some few localised lesions, the disposition of the carcase would be the same, *viz.*, "passed for food." But if, in addition to these lesions, one found slight lung lesions and/or slight intestinal lesions, the carcase would be "passed for cooking."

What does "passed for cooking" mean? The carcase, or parts, are required to undergo cooking at 170° F. for at least 30 minutes. The fats which are thus obtained are suitable for use as lard or tallow, and the meats may be used for canned meat, sausage, cooked or boiled meat, meat loaves and similar products. The cooking is to be accomplished either in advance of the preparation of these products, or during the processing. If the cooking is to be accomplished during processing, then meats which have been "passed for cooking" shall constitute not less than 50 per cent. of all the ingredients; and should it not be possible to provide the necessary cooking, then carcases and parts should be condemned.

MEAT INSPECTION IN DENMARK

Dr. **K. Seidel** (Deputy Veterinary Chief of the Health Committee, Copenhagen), who followed as the second opener of the discussion, said: Before entering upon the problems dealt with by Mr. H. Thornton in his introduction to this debate, I should like to give a brief summary of the organisation of Meat Inspection Service in Denmark.

There are two Acts in Denmark forming the basis of our meat inspection, namely:

(1) Act of May 27th, 1908, governing the inspection of meat to be exported, etc., and

(2). Act of April 14th, 1932, governing the inspection of meat intended for consumption by the home market.

The essence of both these Acts is that all animals must be inspected by veterinary surgeons before as well as after killing. These are exceedingly important regulations. Moreover, it is laid down that the veterinary surgeons in question must be approved by the Ministry of Agriculture, and, on their appointment, the qualifications of all the applicants are submitted to a Committee appointed by the Danish Veterinary Association, who examine the qualifications of the applicants, subsequently giving an opinion on these to the Ministry.

Besides the inspecting Veterinary Surgeons, there are Superintendents, who are present in the slaughterhouse during the whole of the working hours. These are preceded by the veterinary surgeons, and see to it that the regulations of the Acts as to proper treatment of the animals to be killed as well as of the carcases in the slaughterhouse are duly complied with.

Veterinary Surgeons and Superintendents are required equally to conform with the instructions prescribed by the Ministry of Agriculture, and the veterinary surgeons are further required to proceed in accordance with the rules for inspection that likewise have been fixed by the Ministry.

In addition, Veterinary Surgeons and Superintendents can be appointed and discharged by the Ministry only, and the salaries they receive are fixed by the Ministry.

Another important task of the inspecting personnel is to supervise that the meat or offal which, on veterinary inspection, cannot be admitted to the 1st or 2nd class but is found to be unfit for human consumption, is actually destroyed—of recent years this has been effected by transferring such meat or offal to authorised destruction units—and also to ensure that the carcases which, on their inspection by the Veterinary Surgeon, are referred for sterilisation, are actually sterilised and sold from the slaughterhouse direct to the consumer.

As to the marking of the carcases admitted to the 1st class, I shall confine myself to mentioning—as undoubtedly my hearers will be aware—that we have a special 1st class mark for carcases of pork specially intended for export to England: the so-called Lur Brand, which guarantees that the carcases in question, neither on the *ante-mortem*, nor on *post-mortem* inspection, showed any signs whatever of any illness or pathological changes.

Further, it should be added that the Act governing the inspection of meat for consumption by the home market covers two categories of slaughterhouses, *viz.*:

(1) The public slaughterhouses, in which the inspection is organised in the way mentioned above for the export slaughterhouses, so that the marking of carcases is the same for these two categories of slaughterhouses, while the meat from animals killed in these places, and referred to the 1st class A (Lur Brand), 1st class B (blue oblong stamp), and 2nd class (black rectangular stamp) is also, as a matter of fact, released for export from Denmark; however, the public slaughterhouses must have a special licence from the Ministry in order to be allowed to export such meat and offal, but generally such a licence is very easily obtainable, the inspection, as already mentioned, being organised in the same way as for the export slaughterhouses.

(2) Private slaughterhouses which, for the most part, are to be found in the rural municipalities, and in which the inspection is organised in a somewhat different way, inasmuch as each employs

one veterinary surgeon only, who subjects the animal to be killed both to an *ante-mortem* inspection and a *post-mortem* inspection. They do not employ a superintendent who has to be present in the slaughterhouse during all the working hours, and, consequently, the regulations differ from those which apply to the two other categories of slaughterhouses. The 1st class stamp is circular in shape and of blue colour, the 2nd class stamp is square and black. Meat and offal from these slaughterhouses must not be carried beyond the boundaries of Denmark but is intended for consumption by the home market only. It should be added that only a very small proportion of the animals slaughtered in Denmark are killed in these slaughterhouses. The veterinary surgeons employed by the private slaughterhouses must be authorised by the Ministry of Agriculture, who also fix their salaries. The veterinary surgeons carrying out this inspection are usually general practitioners, whereas the veterinary surgeons of the other slaughterhouse categories are wholly engaged on meat inspection.

All categories of slaughterhouses are regularly controlled by the Ministry (veterinary surgeons employed by the Ministry), and it should be added further that the equipment (buildings, etc.) of all the categories of slaughterhouses must be approved by the Ministry of Agriculture.

All over Denmark, where distances are not so very great, food laboratories have been provided for the inspecting veterinary surgeons, in which the Inspectors can undertake any bacteriological or other laboratory test they may desire. In the public slaughterhouses, however, and in many of the export slaughterhouses, there are well-equipped bacteriological laboratories, which are under the management of the Chief Veterinary Inspector.

As to the number of slaughterhouses, in Denmark there are 82 export slaughterhouses, ten cattle export slaughterhouses, and 74 public slaughterhouses (73 of which have been approved as export slaughterhouses). Moreover, killing takes place in private slaughterhouses in 1,087 municipalities; however, as already mentioned, it is a very small percentage of the total kill.

The transportation of the animals to the place of slaughtering involves no great problem in Denmark nowadays due to the short distances, and to the modern means of traffic. However, as far as concerns the city of Copenhagen, the situation of which involves that live animals have to be transported from all parts of the country, the slaughterhouse animals may often be exposed to difficult and fatiguing transportation. There we have the same experience as stated by Mr. Thornton: that such animals are stabled in the slaughterhouse, and fed and watered till they are fit for slaughtering—a circumstance which is well-known to the owner of the animal in question, and which he is interested in carrying through.

Any animal which on the *ante-mortem* inspection by the veterinary surgeon proves to be suffering from a general systemic disturbance, or from diseases which, in the Inspector's opinion, are not of a temporary nature, must be transferred to a separate slaughterhouse room.

As to emergency killing of animals due to sudden diseases or accidents, I can add that these must be marked in a special way (triangular stamp, 1st class in blue colour, 2nd class in black colour), and that meat and offal of such animals must not be sold beyond the boundaries of the municipality in question, and if the emergency killing takes place outside the authorised slaughterhouses the carcase must be accompanied by a certificate issued by a veterinary surgeon, giving full details as to the nature of the disease or the accident.

The inspection regulations also contain rules for bacteriological examination, and in case the slaughterhouse in question does not possess the necessary laboratory, the material, in accordance with definite rules, must be forwarded to one of the laboratories approved by the Ministry, and the carcase in question must not be released for human consumption until the result of the examination by the laboratory is available.

As to the presence of Salmonella bacteria in domestic animals, and the possibility of the latter conveying such bacteria to man in Denmark, I should like to mention the work published on this subject in 1947 by A. C. Hansen, Veterinary Surgeon, and employed in the Copenhagen Board of Health Laboratory.

Mr. Hansen, among other things, examined faeces from 517 oxen, 144 calves, 31 horses, 32 pigs, 239 dogs, 86 cats, and 129 rats—a total of 1,179 cases. In one case *S. typhimurium* were found in a dog, and in three cases ratteen bacilli were found in rats. Although these examinations are rather few in number, they serve to support the supposition that Salmonella bacteria are seldom met with in the intestinal canal of animals in Denmark in a degree worth mentioning.

Further, the author also examined several articles of food on their contents of Salmonella bacteria, such as chopped meat, forcemeat and meat salads, and in no case did he find any Salmonella bacteria.

I would refer, in addition, to the examination at the National Veterinary Serum Laboratory during the years 1936-1945 of 14,600 animals, which were sent to the laboratory in order that the disease or the cause of death might be ascertained. The results of the examination are shown in the table below:

By examinations in the Copenhagen public slaughterhouses during the years 1936-45, in a total of 2,051 animals to be killed no Salmonella bacteria could be ascertained. On the other hand, the material from the laboratory for poultry examinations (referring to 27,886 samples originating from ordinary domestic poultry, which were subjected to bacteriological examination during 1934-45) shows that Salmonella infections of poultry appear rather frequently—1·26 per cent. of the total number of samples received for examination—and that pigeons are most frequently attacked; next come ducks and geese, whereas fowls show the lowest figure of infection. *S. typhimurium* are the most frequently appearing bacteria.

As to the presence of Salmonella bacteria in slaughterhouse cattle, calves, oxen, horses, swine, and sheep, it must be supposed that—with the exception of *S. dublin* and *S. cholerae suis*—they are so rare as to be of no practical importance in Denmark; however, as regards poultry, things are different, as it has been proved that here Salmonella bacteria appear rather frequently.

Few cases have been recorded in Denmark of Salmonella infections of man caused by domestic animals (one case in connection with swine); in the other cases recorded, it is a matter of secondary infection, where the food in question has been infected by man.

Nevertheless, it has not infrequently been ascertained that poultry are carriers of Salmonella infection to man: for instance, four cases with ducks' eggs as the sources of infection have been recorded.

Conditions in Germany and also in U.S.A. have proved to be entirely different, as here a number of cases have been recorded, in which animals were the unmistakable source of infection to man.

TABLE I

ANIMALS EXAMINED 1936–45 AT THE NATIONAL VETERINARY SERUM LABORATORY

	Number of animals examined	S. bacteria found in	*S. typhimurium*	*S. cholerae suis*	*S. enteritidis* (*Jena*)	*S. enteritidis* (*Gaertner*)	Ratteen	*S. dublin*	*S. niloese*
Horses (foals)	440	1			1				
Calves (oxen)	7,800*	384	1					383	
Swine	3,220	17(15)	2(2)	7(4)		1(1)	7(7)		
Sheep	290								
Silver fox	2,300	117	14(4)				1	101	1
Mink		9	7(4)					2	
Coypu		7	7(3)						
Other furred animals ...									
Rabbits	300	3	3(2)						
Dogs, cats, guinea-pigs, etc.	250	7	2		2	1	2		
	14,600	545	36	7(4)	3	2	10	486	1

* About 5 per cent. oxen. No S. bacteria were found in any of these. The values indicated in brackets indicate livestock.

As to the biological facilities for the examination of carcases, I can refer to examinations relating to measurements of the concentration of hydrogen ions in meats, with special reference to the values at the inspection of the meat, made by the veterinary surgeons, O. Winther and E. Langvad Nielsen, of the Board of Health Laboratory. They arrive at the result that the *p*H of well-bled meat with little connective tissue from sound animals 24 hours after the killing is always less than 6·0 in the case of oxen and horses, and of practically the same value, or a little higher, in the case of calves. As a rule, the *p*H of good quality pork is somewhat lower in value than that of other slaughtered cattle; however, in swine we often find muscular tissue the colour of which is deeper (darker) than the ordinary muscles of that animal (it is not a question of blood-filled muscles), and the *p*H of such muscular tissue is practically always considerably higher than that of other muscles.

When examining the muscles of slaughtered animals, which had been rejected by the meat inspector on account of different lesions, only two carcases were found, the *p*H of which was higher than 6·20, and these two animals, as mentioned, had already been rejected on account of their illnesses.

When examining the muscles of 195 slaughtered animals, which had been referred by the meat inspector for bacteriological testing —with the exception of pork—only one case was ascertained, in which the *p*H was higher than 6·20, *i.e.*, 6·24. Examinations of two pigs showed values of 6·46 and 6·26 respectively, the 6·46 examination being carried out on dark-coloured muscles.

On examination of 412 ox carcases, stamped with the 2nd class stamp, only two cases were ascertained in which the *p*H was higher than 6·20, *i.e.*, 6·30 and 6·50.

In their conclusions as to the results of these examinations the authors state that the meat inspector will seldom come across increased values of *p*H in slaughtered animals, on which he cannot, on the basis of existing pathological-anatomical conditions, reject the carcases, and that in their opinion systematic measuring of the *p*H as a general link in the meat inspection is of no essential importance, and consequently might not be required.

On the other hand, some importance must be attached to the measurements of the *p*H as, for instance, in cases of doubt with regard to emergency slaughter. However, here also measurement of the *p*H will enter only as a link with the other procedures of examination.

The authors have also been measuring the *p*H with a view to ascertaining acidity and commencing putrefaction, but they arrive at the conclusion that the measurements fail whenever it is a question of autolysis "putrefaction," and that carcases in most cases will have to be rejected on account of superficial mould before the *p*H of the interior of the muscles shows an increase worth mentioning; moreover, lumps of meat and chopped meat, showing too high values of *p*H, will most frequently have changed to such a degree as to allow the diagnosis to be made by smelling alone.

As already mentioned, the results of their examinations are that measurements of the *p*H may very well, in some instances, enter as a link into the other examinations of the meat, but do not suffice as an independent universal examination.

The said measurings of the *p*H were carried through electrometrically, the authors having found that colorimetric determination was very inaccurate—due, amongst other things, to the colour of the muscles proper.

The ionometer used has a measuring capacity of 1/10 millivolt, corresponding to three decimals in the value of *p*H. The measurements were made with an accuracy of two decimals, and the accuracy was carefully checked, as for each series of meat measurings, buffering solutions with indicated values of *p*H were measured.

As to the judgment of tuberculosis, rules are contained in the "General Rules for Examination of Slaughtered Animals," published by the Ministry of Agriculture in accordance with the aforesaid two Acts governing the inspection of meat. In this connection, I wish to remark that paragraph 1 in these instructions provides that public inspection of meat must be exercised by veterinary surgeons only.

In the judgment of tuberculosis, the following factors should especially be considered:—

1. The spread of the disease
2. The form in which the tuberculous processes appear (by older processes are understood such as are caseous, sclerosed, or totally enclosed).
3. The method of spread.
4. The condition of the animal.

(*a*) The carcase can be referred to the 1st class (blue stamp) (1) when the disease is of an absolutely local nature, being seated in one or more organs, or in the lymph nodes of the same, and when the tuberculous processes are not widespread, (2) if the disease is generalised, and if the generalisation appears through few older processes in the organs only, but only if the state of nutrition of the animal is uninfluenced by the disease, and (3) in respect of cattle, through tuberculous incrustations (about the size of the palm of the hand) on the pleura of well-nourished animals, insofar as the existing tuberculosis does not justify a more severe judgment. The incrustation is removed to the necessary extent together with the ribs situated under the same.

(*b*) The carcase must be referred to the 2nd class (black stamp) (1) in all the cases mentioned under (*a*) whenever the disease has had influence, in an obvious degree, upon the condition of the animal, although the animal cannot be characterised as being emaciated, (2) when the illness is present in lungs and liver at the same time to a greater extent, and especially if the infection is so advanced as to secrete pus, (3) when the disease, besides in lungs and liver, appears also in other organs in a higher degree than mentioned under (*a*), (item 2), and the infection is an older one, (4) when the disease appears in one or more organs, or somewhat widespread in the pleura or peritoneum, or in both of these and in one or two muscular glands,* provided that the processes in these are older ones, (5) in the case of new tuberculous infections of the pleura (except in the cases that come under (*a*), (item 3), or in the peritoneum, or in either of these at the same time, provided that the presence of the disease in other sites presents no obstacle to this (see, however, (*d*), (item 4). (6) In the case of slight pleural tuberculosis, the infected part of the pleura is removed together with the associated ribs; in the case of widespread infections the whole of the chest section must be removed and condemned. In cases of peritoneal tuberculosis, the peritoneum with the underlying adipose tissue and glands as well as the fleshy parts of the belly must be condemned, together with the diaphragm.

(*c*) Well-nourished carcases, after removal of the accessible lymph nodes, may be sterilised by means of steam in the case of (1) fresh generalised tuberculosis, even though only one organ is harbouring embolic processes, provided that the animal has not been obviously ill, (2) older generalised tuberculosis, where generalisation is apparent in more than two of the muscular glands, (3) somewhat advanced acute tuberculous broncho-pneumonia, (4) cut-off meat, when tuberculous processes appear in the bones, or joints, or in the central nervous system. (5) Insofar as sterilisation by steam cannot be effected under the supervision of the veterinary surgeon, the meat (as to 1 and 4) must be condemned.

(d) The carcase is totally to be condemned, (1) in cases of tuberculous processes in the meat proper, (2) in cases corresponding to the one mentioned under sterilisation by steam, and, if the animal has been obviously ill, (3) in cases where, during the slaughtering, substantial accumulations of liquid and secretion of fibrin are present in one or more cavities, (4) in cases where a carcase, due to extensive incrustation of the pleura and peritoneum, is of a repulsive appearance. (5) In cases where the animal, on account of the disease, has assumed a cachectic state with gelatinous adipose tissue, (6) in new-born calves with congenital tuberculosis.

(*e*) Tuberculous organs.

In cases of glandular tuberculosis, the corresponding organs must be removed, even though apparently they are not infected. In cases of less extensive mesenteric glandular tuberculosis in swine, the intestines, however, may not be removed.

In cases of more extensive tuberculosis in the lungs, the heart should be condemned.

In cases of less extensive localised tuberculous processes in the lymph nodes of the head and the tongue, the head should be condemned, and the tongue should be stamped 2nd class after removal of the entire root of the tongue. With larger tuberculous abscesses in these sites, however, the tongue also should be condemned. In swine, all the lymph nodes of the neck should be removed.

As to sterilisation of the carcases by steam, this must be carried out in the abattoirs under the supervision of the inspecting veterinary surgeon, and the sale of the meat takes place direct from the abattoir. The carcases in question must not be released for free trade.

I would add that the percentage of tuberculosis in slaughtered animals in Denmark has decreased enormously during the past ten

* Muscular glands include, besides the muscular glands proper, also those of the udder, and, in the absence of any tuberculous infection of peritoneum, also the lumbar and iliac glands.

years—in full-grown cattle from 40·3 per cent. to 2·43 per cent., and in swine from 4·5 per cent. to 1·21 per cent. This very considerable decrease is due to the very energetic efforts of the breeders of domestic animals to do away with this scourge within the said period of time, and to-day it is the fact that vast districts of the country are completely freed from tuberculosis in domestic animals.

Finally, I have to emphasise:—

1. That public meat inspection in Denmark can be performed only by veterinary surgeons, who have to subject the animal to be slaughtered to *ante-mortem* and *post-mortem* examinations immediately before and after slaughter. The qualifications of the inspecting veterinary surgeons are tested by a Committee appointed by the Veterinary Association of Denmark, and the Committee submit their opinion on the applicants to the Ministry in accordance with the qualifications of the applicants in question, *i.e.*, it is required that the inspecting veterinary surgeons must have received special training, and the veterinary surgeons employed by the large abattoirs must occupy themselves exclusively with the work of inspection.

2. That the large abattoirs possess bacteriological laboratories, which are supervised by the Chief Veterinary Surgeon, and for the smaller slaughterhouses there are authorised laboratories all over the country, to which the inspecting veterinary surgeons can send samples for further examination (bacteriological and biochemical tests, etc.) to support their routine examinations of animals to be killed and carcases.

3. That tuberculosis in domestic animals in Denmark, during the past ten years, has decreased so rapidly that, in view of the continuing campaign for its abolition, it can be expected that Denmark, within a not too distant future, will be completely freed from this disease. (Applause.)

General Discussion

Mr. J. S. Steward (Wilmslow) commenced by thanking the previous speakers for their very interesting contributions. Any remarks he was about to make merely represented his own personal view, and any criticisms were incidental to the suggestions put forward for improvement. It was quite clear from the present standards which should be expected in a civilised country that only people with an adequate knowledge of pathology and bacteriology could hope to supervise meat inspection. Such a statement hardly needed elaboration although in this country it did not appear to be reasonably recognised. At about 1940 the golden opportunity had been missed when all meat inspection could easily have been brought under veterinary supervision, namely, at the time when slaughtering was centralised by the Ministry of Food. The control of milk production and inspection of dairy cattle for diseases which were a danger to man was also indisputably a veterinary province. The position was developing well prior to April 1st, 1948, when the Animal Health Division deprived local authorities of their responsibilities in that direction but failed to implement its promises to provide a fine unified service. The standards might have been unified but at a lower level than should be, compared with best pre-existing public health standards.

Since April 1st, 1938, when the Ministry of Agriculture took over the veterinary staffs of the county councils, the profession had lost a large number of whole-time veterinary meat inspection appointments. Three people out of four then on the platform would be able to name the boroughs concerned but the speaker could not recollect them all; there were nine or ten of them at least. If the Ministry of Agriculture were able to offer to accept these borough veterinary officers when they "grew out" of their appointments, with their superannuation and years of service recognised for acceptance and to accept at a reasonable level of seniority, their experience would be of value to the service, a loss to the country would be prevented in the public health service, and also a loss to the profession of a valuable source of information. The headquarter's organisation of the Ministry of Agriculture had, he believed, segregated the Animal Health Department into an incongruous subdivision of the Ministry. That was their internal organisation and perhaps should not bother those outside, but it affected the possibility of proper development of the profession in service to the public. This segregation of the Animal Health Department rendered it difficult for the Ministry's Animal Health Department to take over full responsibility for milk production.

There had recently been a change in leadership of the Ministry of Agriculture which might indicate a change in policy, and one hoped to see an increase in the public health value of the Ministry and its Animal Health Division. Unless the Ministry's staff took a greater interest in public health it would not earn its proper place in public life and it might be very difficult for it to avoid absorption into a purely agricultural service. It was to be hoped that in future the public health value of the profession would increase and not decrease.

Mr. N. M. Clayton (Birkenhead): Mr. Thornton's description of "breakdown" cases noted in certain tuberculous carcases was a very interesting one. He had seen several similar cases in Birkenhead but had treated them as reinfection ones and had, therefore, condemned them because of the new active lesions.

Regarding skin tuberculosis, some 200 cases had appeared in Birkenhead during last year and he thought this figure would be much increased this year. This complaint had started about three years ago, before which time none had been noticed. On the point of centralised organisation, as stressed by Mr. Steward, he agreed that this should be the aim of the N.V.M.A.—to go "all out" to this ultimate end. He had noticed, in the adjoining hall, that extracts from the Press showed that propaganda on meat inspection had commenced. He was very glad. He thought the economic aspect of meat inspection should be emphasised more, right from the production of slaughter stock onwards. Even the clearing of damp or marshy pasture should be investigated, in view of the appalling waste of meat, for instance liver, as the result of fluke cirrhosis: in Birkenhead, every day of slaughtering, enough liver to give 10,000 people a half a pound per head. It would be a good idea if new pastures could be found for young grazing stock.

He would like more information on the *p*H testing of meat. Personally he had thought colorimetric tests were tiring if carried out in large batches at a time and he did not think the average meat inspector was sufficently trained to carry out such tests. Such a system could only be worked under "centralisation" with laboratories reasonably near at hand.

Mr. C. G. Allen (Birmingham), after congratulating the author, said he had been a little disappointed at the title of the paper because he had hoped to hear something about other foodstuffs as well as meat. He thought it was well known that one of the problems worrying the food inspection departments at the present time was that of canned foods. Some of them were of a very inferior quality, possibly due in some cases to long and/or bad storage, but in Birmingham they had recently had a lot of inferior canned foodstuffs which had been imported only recently from the Continent and quite recently manufactured.

With regard to meat, there was a real need for a veterinary *ante-mortem* inspection of our food animals and this was particularly important in the case of casualty animals. Secondly, there was a great need for modern abattoirs with veterinary supervision and laboratory facilities. This year, in collaboration with Dr. Lovell, he had been able to get a veterinary research officer attached to his laboratory at Birmingham abattoir. It was only a temporary measure but this officer had been working on diseases of calves found in the course of routine inspection. This was only a start, and he looked forward to a time when they would have such veterinary officers in all the large abattoirs to carry on similar research work in addition to the ordinary job of inspection. At his laboratory he could not say that every case of emergency slaughter necessarily entailed the flesh being bacteriologically examined; the matter was left to the discretion of the veterinary inspector and if he wished for such an examination of the carcase he would have it made.

It would be interesting to hear Mr. Thornton's views about horse flesh. At present they were getting an increasing amount of horse flesh prepared for human consumption and the origin of some of this meat was rather wrapped in mystery. Many towns had not the facilities for slaughtering horses and so the meat arrived ready dressed; therefore it was difficult to know where it had come from and whether or not it had been properly inspected. A suggestion would be to have these horses slaughtered in Government controlled abattoirs, again with veterinary supervision, and stamped as having been inspected to show the origin of the meat.

Mr. E. R. Callender (Lytham): He was not engaged in meat inspection but that did not preclude him from contributing or from expressing his gratitude to previous speakers. Mr. Thornton had made a point in his paper that the Control of the Slaughter of Livestock Order was a measure towards the avoidance of transporting livestock undue distances. It would be agreed that this had failed lamentably. To-day, there was just as much transporting of livestock as ever; one had only to get involved in an outbreak of foot-and-mouth disease to realise this. A large amount of this transportation was unnecessary. Cows that had finished milking were bought by one dealer, passed on to another, and transported all over the country. One would like to see measures brought about to stop a lot of this unnecessary traffic and to ensure that such animals were dispatched with as little delay as possible to the abattoir.

A point had been raised about the necessity in some cases of animals being fed and watered in abattoirs; it was agreed, but at a great many of them they had no facility for doing this. Mr. Thornton had mentioned *ante-mortem* examination or inspection and

it had been said that this was the exception rather than the rule. The speaker did not know what applied to the country generally, but in that particular area about 70 per cent. or 80 per cent. of the animals were inspected at the collecting centres, before being forwarded to the various abattoirs.

Mr. E. F. McCleery (London) expressed his thanks to Mr. Thornton for his very instructive paper and also to Colonel Egan and Dr. Seidel, the openers of the discussion.

He considered the paper required deep study and thought; it should be read on a number of occasions before it could be properly digested.

The subject of horse flesh was causing concern to a number of people engaged in meat inspection and was a matter which could usefully be considered by the authorities concerned.

The policy of permitting slaughterhouses and knackers' yards to be in close proximity to each other was also a matter which required urgent consideration. He knew of at least one case adjacent to his own area where the two were side by side in the same yard, and on one occasion he had undertaken an investigation on the premises into an outbreak of anthrax. It was said that the particular animal had been handled in the knackers' yard, but who was to know?

In his opinion, the 1938 Veterinary Surgeons Bill had considerably retarded meat inspection throughout the country. Before that time meat inspection was making progress, but since then no progress whatever had been made, as evidenced by the fact that quite a few local authorities, which had previously employed one or more veterinary officers, did not employ any to-day. It was to be hoped this position would be remedied.

Mr H. E. Bywater told Congress that he had already discussed Mr. Thornton's paper with him privately. This paper was exceedingly good and had done a great service to the Association. Mention had been made of the fact that England and Wales were in rather a different position from Scotland, and the speaker wished that Northern Ireland had also been mentioned. Meat inspection in Scotland and Northern Ireland was far different from that existing in this country. It had also been stated that slaughtering should take place in the consuming area rather than in the producing area. Colonel Egan had led them to believe that his views were opposed to that, but conditions in America were different. This was a small country and one might need to be reminded that meat inspection here was carried out by, and at the expense of, local authorities and local authorities in the consuming areas were much more conscious of the need for inspection than those in the producing areas; furthermore, the rateable value of the consuming areas was much greater than that of rural areas. For efficient meat inspection in this country the slaughterhouses should be placed in the consuming area, but they should not be placed (as most were at present) in the centre of large towns. They needed to be on the edge of the area, and, if the Minister of Town and Country Planning would allow it, in the Green Belt.

Knackers' yards were sometimes attached to slaughterhouses but no responsible public health authority should ever allow a person to hold a licence for a knackery with slaughterhouse adjacent. Last year, 20,000 horses were slaughtered in the speaker's area for human consumption and the tragedy of this was in the fact that by far the great majority of them were good healthy horses. They could have been put to better use and, incidentally, it would have been much more profitable to the veterinary profession had they been used for the purpose for which they were originally bred, namely, work. Horse flesh from healthy horses was very good meat. Personally he did not eat it, but one did not always practise what one preached. The amount of disease in horse carcases was very small when compared with that in the bovine carcase, and it was to be regretted that the Ministry of Food had not done something to regularise the slaughter of horses.

Although a great deal of the meat used for manufacturing processes was suitably cooked, a great deal was used for sausages, and he had yet to see a sausage which was properly cooked. The inside of a sausage was never sterilised—this was so at the centre of the sausage and there was this very great danger when meat of doubtful value was being released for manufacturing purposes. It had been said during the discussion that doubtful horse flesh was reaching certain towns and, despite what he had already said about the comparative suitability of this flesh, if the animal were killed in a "hole in the corner" manner the standard of hygiene inevitably went down with a bang and one was liable to get *post-mortem* contamination.

He agreed that some easement in the judgment with regard to rejection of carcases as a result of tuberculosis might be permissible but it should only be done under the supervision of expert meat inspectors. If "Memorandum 62, Foods" was lowered in any degree then the standard of meat inspection in this country would have to be very considerably raised. He advocated that they should not under present conditions reduce the standard as laid down in this Memorandum.

A paper had been read at one Congress with regard to milk production and it had been stated that it should be the responsibility of the central authority. The Ministry of Agriculture subsequently took over the control of milk production, and those who had hoped to set up the service they had in mind were somewhat disappointed. At about the same time, the Association had published two memoranda—one on the control of meat and one on the control of milk. One could not see any logical reason why the arguments put forward with regard to milk control should not apply to meat. The defects in the Government's intentions with regard to milk were not entirely due to laxity on the part of Ministry of Agriculture officials. Other people in Government offices had a say in things, and much as he deplored the present position with regard to milk, he did not think the Ministry of Agriculture veterinary staff were to blame. If ever they took over meat inspection it was to be hoped that the powers-that-be would look more kindly upon the advice given by their veterinary experts.

Dr. W. R. Wooldridge (London): He was forced to speak because he felt very deeply with Mr. Thornton and everyone else interested in this side of their work about the complete failure of the profession in Great Britain to procure any advance in the standard of the Meat Inspection and Control Service. This was not the fault of the profession or of the National Veterinary Medical Association. As an Association they had repeatedly put the case before the Government—steadily since about 1930, with occasional attempts before then. In the early 30's a committee of the Association had reviewed very carefully the conditions of the various branches of veterinary service in this country and they had drawn up a report entitled "Reorganisation of the Veterinary Profession." This report had advocated a nationally co-ordinated service for all work concerned with veterinary state medicine, including meat inspection. It had emphasised, by quoting from a large number of authorities, veterinary and others, the chaotic condition of their organisation in the many local authorities and the Ministry. Partly as a result of that publication, perhaps, the 1938 Act came into being; but everybody in the profession was sadly disappointed at the result. As was appreciated, soon after that Act had come into being a large number of veterinary experts on food inspection joined the newly named Animal Health Division of the Ministry of Agriculture. They had done so in faith and hope, expecting to be given an opportunity to continue their work for the improvement in the quality of meat and milk, but exactly the opposite occurred. Taking the widest view meat inspection in this country had gone back ever since that date despite the heroic efforts of some members.

The Association had twice prepared reports on this subject, the first was called "Meat Inspection," and the second widened its consideration to "Meat Control." Both of these reports had been written in the hope of persuading the powers-that-be to do something in the matter, for it was realised that in a democracy they could not get their own way unless they could persuade the people that it was necessary. This had to be done by extensive propaganda, which to be successful had to be factual. Collaterally, there had to be the right people in the right places within the consequent bureaucracy which had to run the service, for these "administrators" had such power in any democratic community. However, despite these two reports and many articles in the Press, of varying nature, indicating the major part which the profession must play in an efficient service of meat inspection and meat control, little had been done. Why was this so? Why was it possible that in a country where, approximately, 50 per cent. of the meat was home produced as a rule, and 50 per cent. imported from abroad, we insisted upon the highest standards of inspection of the imported meat while we did nothing, practically speaking, about the other? If the percentages were 90 per cent. and ten per cent. there might possibly be some excuse, but this was not the case. Nobody in his right senses could admit there was any reason why we should insist upon those high standards on meat from abroad while not doing so on the meat produced at home, except for one simple fact, namely, that until recently the Ministry's Animal Health Service in this country was almost entirely concerned with the control of the notifiable diseases.

The veterinary profession had had a say, and a strong say, about what was to happen to meat coming into this country because of the necessity to keep out these notifiable diseases. If they could persuade their leaders to take a strong line in the interests of animal health with respect to imported meat surely there was an equally strong line possible for the control of home-killed meat in the interests of the control of disease on our farms. Why was it that in spite of the arguments the procedure necessary to get a good meat inspection service had not taken place? When the speaker had been President of the Association, and, indeed, during the period of his predecessor in office, there had been great activity "off the record" to try and get this inspection put on a sound basis. Key persons in the three Ministries concerned—Health, Food and Agriculture—were consulted and it seemed reasonably certain that

had the Ministry of Agriculture wished to take over meat inspection this could have been done provided they had given the assurance that it would be done properly from the point of view of the safety of the meat for human consumption. The Ministry of Agriculture had been so imbued with the necessity of having sufficient expert personnel they had not faced up to starting a centralised meat inspection service. They had not appreciated that their own action in absorbing in large measure the veterinary personnel of local authorities, carried with it an obligation to see this very work continue under their own auspices. Indeed it was their responsibility to the country and to the profession to see that over a period of years this skilled veterinary personnel should increase. In that direction, so far as he knew, they had done nothing.

The Ministry of Food, however, who appeared to be much more interested in quantity rather than quality, had started some sort of centralised service and had introduced veterinary officials into that service. Something had gone wrong at the Ministry of Food and the service had not developed along the best lines. Some, including himself, had some idea of the reason for this failure —but he was not going to express his views upon that. The Ministry of Food had to be taught that the quality as well as the quantity of food in this country was very important, and that in dealing with quality they had to consider it from several points of view; whilst the point of view of human health was most important the possibility of spreading infection amongst animals as a result of infected human food must be adequately considered. This fact had recently been well brought out by the outbreaks of fowl pest introduced by way of imported poultry carcases.

The main theme of his remarks was that they must not, as a profession, let the present ridiculous and almost criminal position rest. If it would have helped, the meeting could have passed a resolution drawing attention to the position, indicating how absurd it was to insist upon such high standards of inspection in countries from which we imported meat while having such a low standard for home-killed meat. The Association might have again to set about that wearisome task of writing a report and presenting it to the organisations concerned; not because the new report would be greatly different from what had already been written but because it would again give the officers a reason for seeing the various Ministries concerned. It was important to do this soon because, as many members knew, an administrative gentleman, with little or no experience of the meat trade or health services, was at present engaged on drawing up a scheme for the centralisation or nationalisation of the meat service of this country. Before being asked to draw up his report, this gentleman had never been in an abattoir before, so far as the speaker knew, and when asked, he knew nothing about any memoranda produced by that Association. Yet that gentleman, not a very important official in his own Ministry, was the one who was being asked to prepare a scheme for presentation to the Government. The whole matter was one for action by the Association, especially as the recent change at the headquarters of the Animal Health Division, coupled with the fact that the whole of agriculture was calling for a progressive animal health policy, made the time propitious. This statement was in no way being made as an attack upon the individual who had just retired from the onerous post of Chief Veterinary Officer, because the speaker believed that in his own sphere, Sir Daniel had done better work than many of the profession realised. But there was now a chance, with the changed circumstances, to drive home the necessity for immediate action if this work was to be properly co-ordinated from the inter-related points of view of the health of the people and the control of disease of farm livestock.

Mr. W. Tweed (Chester): He felt reluctant to spoil the effect of previous speakers, but the present position regarding meat inspection in this country appeared to him anything but promising. In the last ten years they had lost in Yorkshire alone whole-time veterinary appointments in meat inspection, in Sheffield, Leeds, Halifax and Hull. This was not progress.

A number of people had mentioned the Ministry of Food, but surely that Ministry was forced to use the existing service. It was doubtful if the profession was quite clear on what part they wanted to play in meat inspection. The position to-day was unsatisfactory in that the profession accepted responsibility for the health of livestock. It should also have some responsibility for the soundness of animal and meat products and have facilities to use the *post-mortem* information available in the slaughterhouse to enable them to trace back disease to the farm. The best form this liaison could take would be to make the organisation responsible for field work, also responsible for exercising supervision in the slaughterhouse, movement of animals, etc. In his opinion this meant only one thing—that the veterinary profession should have the necessary authority in the slaughterhouse to exercise supervision of meat inspection and link this with disease eradication.

Mr. Thornton had given them the scientific and public health aspects of meat inspection and the necessity for more laboratory diagnosis in this work, which went to show the need for more fully trained men in the Meat Inspection Service in this country. Much of the present routine work involved could be left to sanitary inspectors, but there was a useful sphere in which the veterinary profession could play its part if properly authorised.

Lastly, a point which had been stressed before was the value in the training of the young graduate in *post-mortem* work and recognition of disease as met with in slaughterhouses. In this they expected the support of the college authorities to turn out graduates more "meat inspection" minded.

The Reply

Mr. Thornton, in reply, said that several of the speakers, as he had anticipated, had found themselves at variance with some of the contentions outlined in his paper. On the question of transport, lairage, and *ante-mortem* inspection, it was interesting to hear that in Denmark the distances which stock had to travel to the Copenhagen abattoir also gave rise to similar problems in regard to fatigue as were encountered in Britain. The reason for the poor keeping of the carcases of fatigued animals was that such carcases had an unduly high blood content, the *p*H of the muscular tissue was high, while there was an early migration of bacteria from the intestinal tract. The importance of this latter factor had been illustrated experimentally by Boycott and Price, quoted in Special Report No. 45 (1937) of the Department of Scientific and Industrial Research, who fed salmonellae to rats and then exhausted these animals artificially on a treadmill. It was shown that exhaustion had the effect of greatly increasing the illness and mortality and it was a factor which appeared to convert a latent salmonella infection into an active and fatal one. The above Report also showed that a combination of hunger and fatigue facilitated the passing of bacteria from the intestine to the body more rapidly than did either factor alone. An adequate period of rest was of even greater importance in the case of pigs, whose flesh, in the form of bacon or ham, was not consumed immediately after slaughter. In pigs the muscle glycogen was less readily deposited than in the other food animals, while it was more readily lost by exhaustion, and the empirical objection of pig keepers to slaughtering their gilts or sows during oestrum probably had a scientific foundation, for the restlessness and excitement associated with oestrum caused a depletion of the muscular glycogen, with a resultant high *p*H of the muscular tissue and the onset of deleterious bacterial change in a foodstuff which might be preserved for some months before it was consumed.

The essence of the two Danish Acts governing meat inspection, that all animals must be inspected by veterinary surgeons before and after slaughter, was worthy of commendation, and in Germany *ante-mortem* inspection of food animals must take place not more than 24 hours before slaughter, while if practicable the *ante-mortem* and *post-mortem* inspection had to be carried out by the same inspector. *Ante-mortem* inspection, quite apart from its value in the detection of notifiable diseases, was of great value in detecting animals the carcases of which might give rise to food poisoning in man, and animals which appeared very ill before slaughter but in which *post-mortem* lesions were slight and out of all proportion to the cachectic state of the animal should be regarded with the greatest suspicion. *Ante-mortem* inspection was, of course, impossible in the case of emergency slaughtered animals, and one must be impressed by the Danish legislation which prescribed that carcases of emergency slaughtered animals sent to a central abattoir must be accompanied by the certificate of a veterinary surgeon detailing the nature of the disease or accident. This was an admirable procedure which the speaker could recommend to practitioners, for it was his experience that it greatly increased the chances of a more favourable verdict being extended to the carcase.

Dr. Seidel had described the system by which carcases in Denmark, subsequent to being inspected, were graded into three classes, and mentioned that in certain places carcases were sterilised by heat. Both in that country and in the United States carcases found to be affected with certain forms of tuberculosis, or certain parasitic conditions, were sterilised before being released for sale, and it had always amazed the speaker that we had failed to take advantage of this commonsense public health procedure. As Colonel Egan had said, from the point of view of the bacteriologist practically all foods, even though they contained pathogens or enterotoxins, could not cause disease in man if they were properly cooked.

With regard to the bacteriological examination of carcases, the findings of Dr. Hansen in Copenhagen undoubtedly showed that the incidence of salmonellae in the intestinal tract of healthy animals was not high, and Professor Drieux had informed the speaker that in France these organisms were rarely found during routine bacteriological examination of carcases. On the other hand, Professor Lerche had stated that in Germany salmonellae were confined to certain districts, some of which were severely infested, while in other districts salmonellae were rarely found. There was little information as to the incidence of salmonellae in animals or carcases in

Britain, though a valuable contribution on bovine salmonellosis in Wales had been made by Field and had appeared in the *Veterinary Journal* of August, 1948. The speaker would suggest that the scope of this worker's investigations might be extended to include routine examinations for salmonellae in the carcases of all emergency slaughtered animals, and further valuable data might be obtained if the investigation was extended to dead animals consigned to knackers' yards. Whether the incidence of salmonella infections in Britain was high or low did not, however, alter the speaker's contention that a routine bacteriological examination of carcases should be instituted, for it would have the effect of demonstrating the absence of pathogenic bacteria from many carcases, and borderline cases of this type could then be released for sale without further restriction. Quite apart from the danger of salmonella-infected animals to man, the rôle of the animal carrier in relation to disease of the farm stock must be stressed, for most adult bovine animals which recovered from salmonella infections became carriers and were a frequent source of infection to young calves. Few salmonellae, however, were limited to a single host and an interesting observation had been made by Hedstrom in Sweden in 1941 where a salmonella outbreak originated from a garbage heap on to which some dead mink had been thrown. Poultry and turkeys which had access to the heap became infected and eventually the disease spread to the human members of the household. *S. typhi-murium* of an identical type was isolated from the dead poultry and from the human patients.

With regard to biochemical tests as an aid to meat inspection judgment, both the opening speakers cast some doubt on the value of routine estimation of the *p*H of the muscular tissue in detained carcases. The work of Winther and Nielsen, quoted by Dr. Seidel did, however, show that routine *p*H estimation was of value in emergency slaughtered animals, and in Germany it was found to be particularly valuable in border-line cases of carcases of this type; this was an important point, for these were the very carcases which presented the greatest difficulty in judgment. Variations in the *p*H of different muscles of the same animal had been mentioned; the widest variation occurred in the muscles of the pig and Schoon and Doms in Sweden had recorded a range of *p*H 5·7 to 6·7 in the muscle of healthy pigs, the higher figure being found in the red muscles of these animals. This accorded with a report of the Kansas Experimental Station published in 1944, which demonstrated that the cause of "dark cutting" beef was not due to a high blood content of the muscles, as was formerly supposed, but to a deficiency of muscular glycogen and a resultant high *p*H of the flesh.

The question of the judgment of tuberculous carcases was one of great importance, and wide variations in the code of judgment existed in different countries. The speaker was not one who would wish to underestimate the danger of tuberculous meat to man, for the bovine bacillus was a deadly and killing organism although man probably became affected more readily and more seriously by the respiratory route than by the ingestion of tubercle-containing foods. Any member of the audience who would like to be supplied with meat from carcases affected with lesions of the "breakdown" type and who would be prepared to pulverise this meat and inhale it for some months as a substitute for snuff would be contributing a piece of original and informative research! It would, however, be agreed that the only carcases whose flesh was potentially dangerous to man were those in which the tuberculous lesions were constantly discharging, or had recently discharged, tubercle bacilli into the blood and muscular tissue. Such carcases should be condemned and destroyed, but in the case of carcases affected with border-line tuberculosis there was ample justification for rendering these perfectly safe by heat, and the speaker was in full agreement with the section of the Danish code which prescribed that where there was generalised tuberculosis but the animal was not ill before slaughter, or, again, where two or more carcase lymph nodes showed lesions of disease, then the carcase should be subjected to sterilisation. Sterilisation could be ensured by boiling pieces of meat not more than six inches in diameter for two and a half hours, but a preferable procedure was to steam the meat for two hours in a boiler at a steam pressure of 7 lb. to the square inch.

Colonel Egan had touched on the question of the aesthetic justification for condemnation; in other words, the justifiable repugnance of the public to eating the meat of ill or diseased animals. The speaker was glad this point had been raised and he would not suggest that a well-cooked tuberculous liver was fit for food, or that a carcase with evidence of acute haematogenous lesions of tuberculosis should be anything else than condemned. He felt, however, that there was unnecessary waste in connection with border-line cases, either of tuberculosis or of carcases suspected to be affected with septicaemia, and there was little doubt that a reasonable and scientific procedure was that tuberculous carcases of this type should be rendered safe by heat, or that suspected septicaemic cases should be proved safe by bacteriological means.

A moral obligation was imposed on a meat inspection service not only to condemn meat unfit for the food of man, but also to avoid wasting a single pound of meat unnecessarily, and the steps outlined in the speaker's paper indicated how this waste could be obviated whilst still maintaining an adequate public health safeguard. One important proviso must, however, be made; that without a highly and scientifically trained inspectorate any alterations to our present meat inspection code might be fraught with danger.

The Chairman expressed the thanks of Congress to Mr. Thornton for his learned, lucid and constructive paper, and also to Colonel Egan and Dr. Seidel—who had given a pleasant international flavour to the discussion. The meeting, he said, had been most successful.

EARLY FILM TESTS OF TROTTING HORSE

"One of the most interesting acquisitions to be seen in the cinematography collections on view in the recently re-opened third floor of the Science Museum, South Kensington," says *The Times*, "recalls the pioneer work of E. J. Muybridge between 1872 and 1879 on the analysis of animal movements. At that time much controversy prevailed among horsemen whether all four feet of a trotting horse were ever clear of the ground at the same instant.

"Muybridge, who was then director of photographic surveys for the United States Government, secured photographs of Occident, a celebrated horse owned by Leland Stanford, who later founded Stanford University, California. The original photographs were taken on a race-track at Sacramento and, though blurred, were sufficient to show the trotting horse with all feet off the ground.

"The instrument now added to the Science Museum collections is an exact copy, made in the museum workshops, of the Zoopraxiscope invented by Muybridge in 1880 for the reproduction of his photographs in movement on the lantern screen.

"Muybridge, who was a native of Kingston-on-Thames, bequeathed his original instrument to the local Public Library and Museum, where it is still preserved."

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MINISTRY OF AGRICULTURE NEWS SERVICE

Farmers Urged to Keep their Horses.—Our farms have become highly mechanised; the tractor has replaced the horse. But the farmer cannot altogether do without horses and it is important that there should be a good reserve in the country. The horse population has decreased to a disturbing extent and we may be faced with a shortage in the not too distant future.

There are still many jobs that can be done more economically by the horse than by the tractor. Farms should not be denuded of horses; they may well be wanted another day.

It is essential that we should maintain our breeding stock: there is always a trade for the good broken gelding

. . . . . .

Wild Birds and the Land.—"Wild Birds and the Land," a Ministry Bulletin published on October 25th, is something new in official publications.

Of late years there has been in Britain a steadily growing interest in wild bird life, both from the economic and the natural history points of view; and the exceptionally severe winter of 1946-47 with its serious effects on resident wild birds, coupled with the general realisation of the vital need for greatly increased production of food, brought home to the British public as never before the importance of wild birds in relation to agriculture and horticulture. A bulletin of some 26,000 words therefore has been written by the Ministry's Advisory Ornithologist to meet a very considerable demand for an official and authoritative work on the subject.

Although the Bulletin is concerned first and foremost with the economic aspect of British wild bird life, it was felt that the purely natural history side should not be neglected, so there is much in it that will be of interest to the naturalist as well as to the agricultural economist. There is a special chapter on the use of nest boxes and bird tables, and 28 plates illustrating 47 different species of birds, reproduced from photographs taken by several of the leading bird photographers in this country. The photographs—though technically and pictorially perhaps the finest collection of their kind ever brought together in one publication—have been chosen mainly for their clear portrayal of the different birds and as aids to quick and easy identification.

The Bulletin is No. 140 in the Ministry's series and is obtainable from H.M. Stationery Office or from any bookseller, price 2s. 6d. net, by post 2s. 9d.

CLINICAL COMMUNICATION

An Unusual Case of Pyometra in the Bitch

E. J. H. FORD, B.V.SC., M.R.C.V.S.
BUXTON

Subject.—A nine and a half year old Cocker spaniel bitch.

History, Examination and Course.—She was first seen by a colleague on September 29th when the animal showed slight inappetence and malaise. Enquiry revealed she had been in heat three weeks previously. On examination there was no vulval discharge, temperature was normal and no enlargement of the uterus could be detected on abdominal palpation. No drugs were administered and when again seen on October 1st, the bitch was bright and appetite good. As pyometra was suspected from the outset the owner was warned to consult us again immediately should the bitch refuse food or show vulval discharge.

Advice was again sought on October 8th, with the history that the previous day the bitch had suddenly become thinner and a profuse vulval discharge had commenced. Her appetite had varied little, she had been bright and active throughout but had vomited once on the previous day. Temperature was 101·8° F., the bitch was lively, but there was a copious vulval discharge of a light yellowish-brown colour. Operation was performed the next day

Operation.—The anaesthetic was nembutal given slowly by the intravenous route. Seven and a half grains were required which was almost the full dose for a healthy bitch of her weight. The incision was midline; when the peritoneum was incised the omentum beneath was seen to be intensely congested and a considerable quantity of a reddish-brown exudate welled up from the incision. The uterine horns were grossly enlarged, had thickened walls and contained a considerable amount of fluid. The broad ligament was similar in appearance to the omentum, brightly congested, and fluid continued to run from the wound, *i.e.*, there was an extensive peritonitis with much effusion.

As the left uterine cornu was lifted from the wound, the slightly adherent omentum fell away and from a perforation about half an inch from the junction of cornu and fallopian tube poured a light yellowish-brown pus. This pus contaminated the abdominal wound before packing off could be completed.

At this point prognosis was considered to be very grave due to the presence of an inflamed peritoneum contaminated by uterine pus. The operation was completed but before closure of the abdomen 200,000 units of penicillin were infused into the peritoneal cavity and the edges of the wound were dusted with sterile powder of sulphathiazole and penicillin. The operation was completed at 1 p.m. and at 6 p.m. the animal was on its feet and wagging its tail. After the subcutaneous injection of 100,000 units of penicillin the bitch was returned home and a liquid diet advised.

Post-operative Course.—Twenty-four hours after operation temperature was 99·5° F.; the bitch was dull and had vomited after taking milk. A subcutaneous injection of 100,000 units of penicillin was given.

October 11th: Temperature 99·8° F.; the bitch was bright, had not vomited and showed desire for food. A light diet was prescribed.

October 15th: She was brighter, temperature 101·4° F. and appetite good.

October 19th: The skin sutures were removed, the wound having healed by first intention.

Discussion

On first impression this case was a good operation risk; the subject was bright, appetite though variable had not disappeared and temperature was within the normal range. This belief was supported by the amount of nembutal required to induce surgical anaesthesia.

On opening the abdomen quite a different picture was presented: an extensive peritonitis and a ruptured uterus, the contents of which contaminated the operation wound. The uterine fluid in an open case of pyometra was more likely to be infected than sterile and even in the latter case the degree of shock was likely to be severe. The prospect of recovery was remote; yet the bitch made a complete and rapid recovery. To what can we attribute this?

It is well known that the peritoneum and especially the omentum are very resistant to bacterial invasion. This is discussed from the experimental aspect by Markovitch[1]. Steinberg and Goldblatt[2] showed that these anti-invasive powers of the peritoneum could be stimulated prior to an operation by the intraperitoneal injection of *B. coli* and streptococcal vaccines. Morton[3] found that non-specific injections such as normal saline and even the opening and closing of the abdomen produced the same result. Other investigators believe that a vaccine of streptococci and *B. coli* is more effective than the non-specific agents.

Cultural examination of the pus from this case, undertaken by Dr. G. O. Davies of the University of Liverpool, revealed a haemolytic *B. coli*.

It is suggested that the chain of events in this case was somewhat as follows. Accumulation of fluid in the uterus caused a rupture of the left cornu. The escaping fluid set up a peritonitis and mobilised the resistance of the peritoneum. The *os uteri* opened and the resulting reduction in uterine pressure allowed the omentum to seal the rupture. By the time of operation the pre-immunised peritoneum was able to withstand infection caused by leakage from the uterus. The penicillin is unlikely to have influenced the course of events as *in vitro* tests have shown it to have no inhibitory action on the growth of *B. coli*[4, 5].

Acknowledgments are due to Mr. R. S. Howe for permission to record the case and to Dr. G. O. Davies for carrying out the bacteriological examination.

References

(1) Markovitch. (1937.) Textbook of Experimental Surgery. 224.
(2) Steinberg and Goldblatt, quoted by Markovitch.
(3) Morten, quoted by Markovitch.
(4) Annotation. (1946.) *Vet. Rec.* **58.** 327.
(5) Jennings, I. W. (1947.) *Ibid.* **59.** 369.

ABSTRACTS

[Presidential Address. Section of Veterinary Hygiene, Royal Sanitary Institute Congress. Allan, H. B. (1948.) *J. roy. San. Inst.* **68.** 492-495.]

Allan briefly reviews the position relative to the major diseases of livestock in this country during and immediately after the war. He points to the favourable effect of reduced imports of feeding-stuffs on the incidence of such diseases as swine fever and anthrax, offset by the introduction of fowl pest by imports of human food. Despite concentrated troop movements and the general disruption of a war-time economy, he is able to point to considerable progress in the control of brucellosis by vaccination, of tuberculosis by the spread of the Attested Herds Scheme, and of mastitis by the therapeutic application of penicillin and sulphonamides. He concludes with an appeal for continued co-operation by allied professions interested in the problem.

W. T. R.

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[The Modern Abattoir and Meat Inspection. Tweed, W. (1948.) *J. roy. San. Inst.* **68.** 496-502.]

Tweed, as the result of his personal experiences during the war years, advocates the permanent centralisation of slaughtering. He claims that this will lead to a more uniform system of meat inspection in which veterinary supervision and training of lay personnel must assume ever-increasing importance. This, in turn, will tend to improve meat supplies and eliminate waste. To this end, abattoirs must be located near consumer areas, provision must be made for emergency slaughtering, ample cold storage accommodation and laboratory facilities. There must be an adequate system of *ante-mortem* inspection, particularly in relation to animals for emergency slaughter, and closer liaison with animal health and clinical knowledge. Wherever possible all animals should be stunned prior to slaughter and to avoid wastage, much greater attention is needed to meat and slaughterhouse hygiene.

Tweed ends with a plea for the employment of more veterinary personnel in modern abattoirs. A plea for laundry and bathing facilities for slaughterhouse personnel was made during the full discussion this paper provoked in which all speakers, professional and non-professional, supported the essayist's several points and his urge for greater uniformity through centralisation or regionalisation of slaughtering to avoid waste and provide a more wholesome product.

W. T. R.

NEW LABORATORIES OPENED AT ROWETT INSTITUTE

Mr. Arthur Woodburn, Secretary of State for Scotland, recently opened the newly constructed laboratories at the Rowett Research Institute near Aberdeen. Recalling that Rowett was the first agricultural research institute to be set up in Scotland, Mr. Woodburn outlined its progress and remarked that teachers and agricultural advisers could not do without research workers, and that the reconstruction of the laboratories formed only a part of the programme of expansion and development of agricultural research to be given effect over the next ten years.

Mr. Woodburn indicated that an important part of the work to be carried out in the new laboratories, would be concerned with the processes of digestion in the ruminant, and said that new light may shortly be thrown on the solution of the serious problem of bloat in cattle and sheep.

THE VETERINARY RECORD

November 20th, 1948

MEAT INSPECTION AND CONTROL

THE paper presented by Mr. Thornton to the Annual Congress of the Association at Southport has again raised the question of standards of meat inspection and control in this country. Mr. Thornton has had a long experience at Newcastle-on-Tyne and speaks with authority. He has indicated the need for an improvement in the quality of our Inspection Services, and has emphasised that such a Service to be of full value to the consumer, must be fully scientific. He has drawn attention to the need for the closest co-operation between the Inspectorate and a laboratory where chemical tests can be made, as well as bacteriological and pathological examinations.

During the meeting the need for an adequately trained Inspectorate was further brought out as an essential part of a disease control policy for the country's farm livestock. These two criteria re-inforce the more obvious assets which a Meat Inspection Service would have if it were organised on a National basis with adequate veterinary supervision.

In the past, the National Veterinary Medical Association has consistently tried to persuade the Government that such a Service was in the best interests of the community. It prepared and presented to the various Departments two Reports on Meat Inspection, and these Reports have received much support in medical and scientific circles, as well as from the veterinary profession. Indeed, in principle, representatives of the three Ministries concerned, namely, the Ministry of Health, the Ministry of Food, and the Ministry of Agriculture, have similarly acknowledged that such a Service was desirable. Several fears seem to prevent the recommended procedures being adopted. The Ministry of Health naturally wishes to be certain that the consumer is to be adequately safeguarded; whilst the Ministry of Food would appear, at least at the moment, to be more interested in quantity rather than quality. For its part, it is believed that the Ministry of Agriculture is in sympathy with the Association's proposals, but fears that it is not in a position, owing to shortage of staff, to link up a Meat Inspection Service with its Animal Health Division.

In our view, this matter admits of no further delay. We are confident that the necessary personnel can be found, and that the adoption of a high standard of meat inspection and control in this country would not only remove much irritation caused to those in countries which export meat to this country, but would also materially assist the supply of home-killed meat, both as far as quantity and quality are concerned. Furthermore, such a Service would be of inestimable value in any policy adopted by the Government for the control and eradication of tuberculosis and other diseases of farm livestock.

UNIVERSITY OF LONDON B.Sc. (VETERINARY SCIENCE) EXAMINATION

Following is the Pass List for the October, 1948, University of London Examination for the Degree of B.Sc. (Veterinary Science): Appleby, Edwin Calvert; Biggers, Jeanne Mary; Chandler, Richard Lionel, and Jordan, Frank Tudor Whitney, all of the Royal Veterinary College.

The following has passed in Part I only: Darbyshire, James Humphrey, of the Royal Veterinary College.

The following have passed in Part II only: Early, James Lincoln and Toovey, James Arnold, both of the Royal Veterinary College.

REPORT

[Northern Rhodesia: Report of the Veterinary Department for the year 1947.]

During the last five years native cattle in Northern Rhodesia have increased by 20·7 per cent., European owned cattle by only 2·6 per cent., bringing the present cattle population up to 770,000. The system of routine inspection and registration of stock by African staff, whilst not yet fully established, has already proved of value in locating and tracing the origin of disease outbreaks before general spread has taken place. Many more African veterinary assistants have become available after completing their training at the school at Mazabuka. African stockowners have been showing a change of attitude towards preventive methods against disease, and a greater readiness to accept, and request, veterinary assistance, especially with regard to the prevention of anthrax and quarter evil, and the treatment of trypanosomiasis.

During the year over 22,000 cattle were inoculated with foot-and-mouth disease virus. As in previous outbreaks, the policy was to inoculate only infected herds and immediate contacts. During the last six months of the year no further outbreaks or extensions were reported. There has been an increased incidence of rabies and vaccine is now being produced locally. The large scale and continuous use of phenanthridinium drugs against trypanosomiasis is reported to have saved the lives of thousands of cattle. In the field single injections of 3 per cent. solution of the bromide administered in doses of 1 c.c. per 50 lb. body weight continued to be practically 100 per cent. curative and no ill-effects had been reported. An outbreak of anthrax caused the death of 156 head of cattle before being got under control by vaccination, and hundreds of blue wildebeeste died from the same cause.

Benzenehexachloride (Gammexane) dips were studied at the Research Station and on neighbouring farms and were found infinitely superior to arsenical dips, and "fully efficient against all types of ticks in all instars." There was some decrease in effectiveness of the wash with age despite attempts to keep the strength to theoretical standard. A combined BHC-DDT dip was also under test and a third tank was to be used for pure DDT emulsion.

Gammexane was found to cause egg taint in poultry up to six weeks after the use of feed from bags dusted with the powder, and for nearly six months after one flock had been dusted and the powder applied to perches, nesting boxes, etc.

Normal departmental expenditure for 1947 was £56,618. Extraordinary provision for development was estimated at £36,924, of which £12,033 had been expended. Departmental revenue was slightly over £1,000. G. P. W.

"FELLOWSHIP FOR FREEDOM IN MEDICINE"

A new organisation of members of the medical profession, "The Fellowship for Freedom in Medicine," was formed at a meeting held in London on Saturday last. Lord Horder, who presided over an attendance of 673 doctors from all parts of the country, said that the profession's own weakness was partly responsible for the National Health Service being "born in dishonour." It allowed itself to be a party in the mad precipitancy of the Government, whereby the public was made to contract for health benefits that did not exist. Medicine had indeed become what the doctors had pledged themselves it never should become, a branch of the Civil Service. "We are no longer experts," Lord Horder continued. "We sit and sign forms. With no time to diagnose their diseases, we pass our patients to other persons and to institutions, knowing full well that they cannot dispense the health benefits which may or may not be needed."

The meeting passed a resolution expressing concern at the way outside influences might affect the quality of medicine in Britain and determination to do all possible to make the highest standards of practice possible in the future. It was also decided that the executive committee should consider ways in which freedom in medical matters could best be preserved by the profession.

Lord Horder was elected chairman of the Fellowship, Dr. R. Hale-White vice-chairman, Mr. Reginald Payne treasurer, and Doctors E. C. Warner (of Charing Cross Hospital) and G. H. Rossdale secretaries.

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WEEKLY WISDOM

". . . Criticism has often been withheld or watered down by fear of the law of libel, and as a consequence some doubtful activities have undeservedly escaped adequate public censure. . . ."—THE TIMES (October 21st, 1948) leading article on the recently published Report of the Committee on the Law of Defamation appointed in 1939 under the Chairmanship of Lord Porter.

REVIEW

["The Veteran": The Official Magazine of the Glasgow Veterinary College, 83, Buccleuch Street, Glasgow, C.3.]

Since the issue last December of the inaugural number of *The Veteran* under the aegis of the Glasgow Veterinary Branch of the British Legion, the magazine has now become the official organ of the Glasgow College, produced by a Magazine Council with its own constitution and representing the various organs within the College. The Council's appeal (see below) for the support of the profession in general again is justified by the standard of content and production and the ultimate aim of a quarterly periodical is to be commended without reserve, should the Council have confidence in maintaining the present standard.

Both the Editor and Professor Blacklock, the Chairman of the Board of Governors, "greet the unseen with a cheer" as the time draws nearer for incorporation in the University of Glasgow, but in the words of the former, "an institution such as ours, with the friendly ties which we have from the past with the citizens of Glasgow, must not allow itself to lose its identity." Tribute is paid to the late Professor Hugh Begg—"few of his students will forget to look in the grip every time they enter a byre"—and at the end of the issue Professor Thomson reminds all whom it may concern of the value of the N.V.M.A.: not as a Trade Union but as "a symbol or outward expression of the desire for fellowship of men and women with common ties." In between, we find a dozen or so brief, but far from ephemeral contributions illustrating many facets in the work of the profession, together with the features customarily devoted to student affairs.

We have been requested by the Magazine Council to draw attention to the following points on their behalf:—

(1) The Council have circularised all graduates of this college (over 600) asking for their support by ordering *The Veteran* in advance. While the reply has been satisfactory it has not been good, and we ask all graduates to keep in touch with their college through this medium. Will any graduate who has not received a copy of the Council's letter please communicate this fact to us.

(2) The Council hoping the *The Veteran* will fill a gap among our present veterinary journals by providing light professional reading matter, amply illustrated with photographs.

(3) The Council invite graduates of all colleges at home and overseas to become contributors as well as subscribers. The individual experience and everyday views of each practitioner are of interest and practical value to veterinary students and also other practitioners.

(4) Copies of the second issue, and a limited number of the first issue, are available, price 2s. 6d. per copy post free, from: Mr. C. M. McCannes, M.R.C.V.S., Advertising Manager, *The Veteran*, Department of Medicine, Glasgow Veterinary College, 83, Buccleuch Street, Glasgow, C.3.

QUESTIONS IN PARLIAMENT

Food Preparation (Regulations)

Mr. Harrison asked the Minister of Food whether in view of the recent cases in which fines were inflicted after it had been established in court that certain meat killing and preparation for made up food had been conducted under filthy conditions, he will review his regulations and their enforcement, and if necessary make stronger regulations and enforce them rigorously in all food preparation depots.

Mr. Strachey: The conditions under which food is prepared for sale for human consumption are governed by the Food and Drugs Act, 1938, which is enforced by local authorities. The cases to which my hon. Friend refers have not disclosed defects in this Act, but they underline the importance of rigorous enforcement, and my officers have instructions to co-operate to the fullest extent with officers of the local authorities with a view to discovering and bringing to justice—as I am glad to say has been done in this case—those who, for personal gain, disregard the public welfare in this way.

Mr. Harrison: Is my right hon. Friend aware that the announcement which he has just made will give great satisfaction to people all over the British Isles, because of the terrible revelations in the cases to which I have referred in my Question?

Mr. Burke: Is my right hon. Friend aware that the most revolting case in Lancashire has been going on for four months, whereby diseased and germ-ridden animal carcases have been supplied in 24 towns to 250 shops? Is he satisfied that his enforcement officers have been aware of this and really awake to the facts, because this case was discovered only by accident? Does he consider that these fines constitute justice, and is it really true that the welfare of the public is safeguarded against a recurrence?

Mr. Strachey: My enforcement officers, in general, only co-operate with the local authorities in this matter, because it is on the latter that the responsibility for enforcement rests. If my hon. Friend has any particular case in mind, in which he does not think that the action taken has been sufficiently rigorous, perhaps he will let me know.

Mr. Royle: Is my right hon. Friend aware that the Press in Lancashire last week received hundreds of letters from members of the public showing very great concern about the cases referred to? Cannot some more immediate and serious steps be taken to restore the confidence of the public in manufactured foods?

Mr. Strachey: There is nothing to prevent the local authorities all over Lancashire or elsewhere from taking the most vigorous action in this matter, wherever they think they have a case, and we shall be very happy to co-operate with them.

Mr. Sutcliffe: Is not the only way to restore confidence, to a large extent, to issue another Statutory Rule and Order dealing with the slaughter of horses for human consumption?

Mr. Sydney Silverman: Does not my right hon. Friend agree that rigorous enforcement would include adequate penalties, and is he not aware that the penalties recently enforced in some cases struck ordinary, commonsense people as being totally inadequate in the circumstances?

Mr. Strachey: As regards the penalties imposed in these cases, there was one set of fines amounting to £2,000 and another of £1,700, which are not light.

. . . . .

Food Regulations (Knackers' Yards)

At a later session Mr. Burke asked the Minister of Food if his attention had been drawn to recent cases in which fines were imposed for continuous and serious contravention of food regulations; and if he will take steps to enable more severe penalties likely to protect the health and welfare of the public to be imposed in cases where large profits are made by the sale of diseased horseflesh for human consumption.

The Parliamentary Secretary to the Ministry of Food (Dr. Edith Summerskill): I am aware of the cases to which my hon. Friend refers and in view of the widespread interest which they have aroused, I would like to say that our enforcement officers have paid special attention to knackers' yards during recent months, but have found no other case of this kind. In the recent cases some charges were laid under orders made by my right hon. Friend, which are enforceable by our officers, but the main charges were laid under the Food and Drugs Act. The responsibility for enforcing this Act rests with local authorities, and we rely on them to exercise constant vigilance to prevent such cases remaining undetected. With this object, Ministry of Food officers have been instructed to co-operate to the fullest extent with officers of the local authorities.

To strengthen the control over the disposal of meat from knackers' yards, my right hon. Friend has made an order which comes into force on December 19th, and which requires anyone carrying on a knackers' yard in England and Wales to hold a licence from the Ministry of Food and to keep records of transactions. My right hon. Friend will also consider what further measures can be taken to ensure that meat products are manufactured under hygienic conditions. Whether to impose fine or imprisonment is entirely within the discretion of the trying court, but the fines imposed in this case were severe, and I trust that they will suffice to deter anyone who has it in mind to endanger the public health in this way. The position will, however, be carefully watched, and if it should be established that the maximum penalties imposable under the existing law are insufficient to safeguard the public welfare, the position will be considered further in conjunction with my right hon. Friend, the Minister of Health.

Mr. Burke: Might I thank my hon. Friend for that reply, which I am sure will give great confidence and reassurance throughout the country?

Mr. Tolley: Would not my hon. Friend agree that in some cases the imposition of a fine, however large, is no penalty upon the offender; and in particularly severe cases is it not right that new instructions should be given to magistrates trying those cases that prison is the only penalty in order to prevent this happening?

Dr. Summerskill: I think that the fine these men are called upon to pay is within the region of £2,000.

Mr. Joynson-Hicks: Can the hon. Lady tell us what consultation she had before deciding upon the further restrictions which she is to impose upon the knackers' yards, and also upon the companies producing meat products?

DR. SUMMERSKILL: Does the hon. Gentleman mean before we introduce this new order—the Knackers' Yards Order?

MR. JOYNSON-HICKS *indicated assent.*

DR. SUMMERSKILL: We consulted the different Departments, and we thought that this was the best way to approach the matter.

EARL WINTERTON: Would the hon. Lady make it quite clear to her hon. Friend, the Member for Kidderminster (Mr. Tolley), that it would be most improper for a Department of Government to suggest to magistrates the penalties they should impose under an Act of Parliament or a regulation?

MR. TOLLEY: Is a fine sufficient?

EARL WINTERTON: Will the hon. Lady answer that question, because she was asked?

DR. SUMMERSKILL: I do not think it is right for me to reprimand my hon. Friend.

EARL WINTERTON: Does the hon. Lady then accept the position put by her hon. Friend, that it is the duty of her Department to give instructions to magistrates?

DR. SUMMERSKILL: No, of course not; but I think it is quite healthy that all publicity should be given to the supplementary question asked by my hon. Friend.

MRS. CASTLE: Following upon that last supplementary question, might I ask whether my hon. Friend is aware that a large section of public opinion has been shocked by the fact that a woman has recently been given six months' imprisonment for forging a birth certificate, whereas in a case like this merely a monetary penalty is to be imposed?

COLONEL GOMME-DUNCAN: Would the Parliamentary Secretary not be led away by that last supplementary question from the really important point of principle, which is that no Government Department should give instructions to magistrates?

. . . . . .

SLAUGHTER OF HORSES

Mr. HAIRE asked the Minister of Health how many horses have been slaughtered in slaughterhouses in the past six months; and what steps he proposes to take to control unnecessary hardship to these animals.

Mr. BEVAN: The figures asked for are not available. With regard to the second part of the Question, the treatment of horses and other animals in slaughterhouses is governed, in general, by the Slaughter of Animals Act, 1933. This is administered by local authorities, and I have no specific power to take action.

. . . . . .

EXPERIMENTAL WORK (ANIMALS)

MRS. MANNING asked the Parliamentary Secretary to the Admiralty what animals it is intended to use for experimental purposes on the vessels which are now being fitted out to experiment with atomic and other similar methods of warfare; and whether he will give an assurance that any animals to be used for this purpose will have to suffer no cruelty.

MR. DUGDALE: It is not in the public interest to give details of experimental work which may be carried out to meet defence requirements. In so far as animals may at any time be involved in such experimental work, the safeguards of the Cruelty to Animals Act, 1876, would be applied.

MR. JANNER asked the Parliamentary Secretary to the Admiralty whether he will make a statement with regard to the vessels which are now being equipped to carry out certain experiments with atomic and other new weapons; what animals, and how many of them, are being used in this connection; is he satisfied that their participation is essential; and what steps will be taken to prevent undue cruelty.

MR. DUGDALE: I would refer my hon. Friend to the reply I gave to-day to my hon. Friend the Member for Epping (Mrs. Manning).

Docking of Horses

From time to time the question of the docking of horses has become an issue, even to the extent of the promotion of a Bill to prohibit the practice. The Association has not recently considered its policy in this matter and is anxious to have the guidance of members.

The question has been referred to divisions, but it is the desire of the Association that the views of individuals specially interested in this question be given due consideration. Members who wish to respond to this invitation are requested to forward their views to the General Secretary, N.V.M.A., 36, Gordon Square, W.C.1 by November 30th, with a reasoned explanation of their basis.

NOTES AND NEWS

Diary of Events

Nov. 24th.—Meeting of the Lancashire Division, N.V.M.A., at Liverpool (The Veterinary Hospital, Pembroke Gardens), 2.30 p.m.

Nov. 24th.—Meeting of the West of Scotland Division, N.V.M.A., in Glasgow (Ca'dora Restaurant), 2.30 p.m.

Nov. 25th.—Meeting of the South-Eastern Division, N.V.M.A., at Tunbridge Wells (Royal Mount Ephraim Hotel), 2.30 p.m.

Nov. 26th.—Meeting of the Royal Counties Division, N.V.M.A., at Reading (Caversham Bridge Hotel), 2.30 p.m.

Dec. 3rd.—Meeting of the South Wales Division, N.V.M.A., at Swansea (Mackworth Hotel), 2.15 p.m.

Dec. 3rd.—Meeting of the Sussex Division, N.V.M.A., at Brighton (Old Ship Hotel), 2.30 p.m.

Dec. 6th.—Meeting of the Farmers' Club, at the Royal Empire Society, W.C.2, 2.30 p.m. (Mr. A. B. Buchanan-Smith, C.B.E., D.SC.: "Inheritance of Milking Capacity in Dairy Cattle.")

Dec. 8th.—Meeting of the Technical Development Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 11 a.m.

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International Veterinary Congress, 1949

H.M. the King has consented to be Patron of the International Veterinary Congress which is to be held in London next year. The main theme of the Congress will be the veterinary profession's contribution to world food supplies. Two or three thousand delegates, from all parts of the world, are expected to attend the Congress at Church House, Westminster, between August 8th and 13th.

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PERSONAL

Births.—HAMILTON.—At Brunswick Square Nursing Home, Penrith, on November 11th, 1948, to Maimie, wife of James Hamilton, M.R.C.V.S., Hill Top, Mateby Road, Kirkby Stephen, Westmorland, a son.

JARVIE.—On November 11th, 1948, to Doreen, wife of Thomas Jarvie, M.R.C.V.S., at Maidstone, a son—brother for Hunter.

PEARCE.—On November 2nd, 1948, to Barbara (*née* Hutton) and John Pearce, of 7, Station Road, Topsham, Exeter, a second son.

PECK.—On November 1st, 1948, at Tabora Hospital, Tanganyika Territory, to Sylvia Elizabeth and Edward Finch Peck, a fourth son.

TREANOR.—On November 12th, 1948, at the Somerville Nursing Home, Hereford, to Doreen, wife of G. A. Treanor, M.R.C.V.S., a daughter.

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R.C.V.S. OBITUARY

AMOS, Sidney Thomas Arundell, Major, S.A.V.C., 305, Musgrave Road, Durban, Natal, South Africa. Graduated London, July 14th, 1897; Fellowship December 11th, 1909. Died July 31st, 1948; aged 72 years.

LUDLOW, Thomas, The Terrace, Mansfield, Notts. Graduated London, May 16th, 1889. Died November 15th, 1948; aged 83 years.

Further reference to "Tom Ludlow of Mansfield," as he was widely and affectionately known, will be made in our next issue.

MCRORIE, James Maxtone Thom, 16, Panmure Place, Edinburgh. Graduated Edinburgh, December 18th, 1924. Died November 4th, 1948.

We record above with much regret the death of Mr. James M. T. McRorie, late of Wigton, Cumberland, who passed away suddenly at his home in Edinburgh. The funeral took place at Warriston Crematorium on Saturday, November 6th. Deep sympathy is felt for Mrs. Margaret McRorie in her bereavement.

Sidney Thomas Arundell Amos

The veterinary profession in South Africa has lost an esteemed colleague and good friend in Mr. Amos, who died in Durban on July 31st, 1948, at the age of 72.

Mr. Amos was born in Clevedon, Somerset, in 1876, qualified at the Royal Veterinary College, London, in 1897, and obtained the Fellowship diploma in 1909. He came to South Africa immediately after qualifying as one of eight veterinarians selected to take part in the campaign against rinderpest. During the Anglo-Boer war he saw service with the Natal Mounted Rifles, was with the forces

besieged in Ladysmith, took part in the battle of Elandslaagte, and, in 1906, during the Zulu rebellion, he was again on active service. In 1909 he resigned from the Government Service and, in the following year, started in private practice in Durban. In 1914 he was gazetted Deputy Assistant Quartermaster General and was with the Union Forces in South-West Africa, and later he acted as Officer Commanding the Veterinary Hospital at De Aar.

In 1902 he married Jane Alberta Martin, of London, who predeceased him some years ago.

Mr. Amos was keenly interested in the turf and was official veterinary surgeon to the Durban Turf Club and to the Clairwood Turf Club. He was a keen horseman, played polo until he was over 60 years of age, and was a member of the Durban team that won the South African Championship on five successive years.

As all veterinarians in South Africa know, Mr. Amos took a very active part in the work of the South African Veterinary Medical Association, and was President from 1936 until 1945. Largely through his zeal and tact the Association emerged from the difficult war years with greater vigour than ever before.

He was Secretary of the Natal Veterinary Board as far back as 1908, was a member of the South African Veterinary Board, and was the S.A.V.M.A.'s representative on the Natal Anti-tuberculosis Association at the time of his death.

To Mr. Amos's daughters, Mrs. L. R. Morford, a veterinary surgeon and a member of the S.A.V.M.A., and Mrs. van der Poel, the Association extends its sincere sympathy in their sad loss.

R. C.

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R.C.V.S. Animal Management Examination

LIST OF SUCCESSFUL CANDIDATES

(*Continued from page 593*)

LONDON:

Ahmad, A.
Ashford, A. O.
Ball, Miss J. B.
Beach, J. E.
Boyde, C. (Credit)
Boys-Stones, P. A.
Catterall, P. W.
Christie, E. J.
Colegrave, A. J. (Credit)
Cook, T. F.
Creyke, G. H. (Credit)
Davies, A. J. (Credit)
Downie, N. F.
Espitalier-Noel, F. S. R.
Faull, W. B.
Hawksley, M. B.
Hoe, Miss C. M.
Jones, B. V.
Jull, D. J.
Kennea, T. L.
Lawson, M. R. (Credit)
Lucas, E. G.
McMillan, D. D.
Peacock, R. (Credit)
Sambell, R. A. J.
Stokes, Miss L. D.
Taylor, Miss J. H.
Tinslay, Miss P. E.
Traynor, D. K.
Wallace, H. G.

DUBLIN:

O'Byrne, T. F.
Pyne, W.
Roddy, R. M.

LIVERPOOL:

Boyt, W. P.
Clarke, P. B.
Davies, G. P.
Davies, J. E.
Dawkins, H. P.
Edwards, D. K.
Evans, A. N.
Fairhead, A. C. W.
Fleetwood, J. D. L.
Grainger, K. J.
Gunner, D. E. (Credit)
Hughes, P. A.
Hyslop, N. St. G.
James, R. H.
Jones, E. H. (Credit)
Keay, A. J.
Kenworthy, R.
Leach, S
Lewis, J. O.
Lucas, J. M. S.
Pryce, R. L.
Randle, P. O.
Roberts, H. G.
Roldis, A. F.
Woods, A. J.

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R.C.V.S. Veterinary Pharmacology, Materia Medica and Pharmacy Examination

(Revised Syllabus)

LIST OF SUCCESSFUL CANDIDATES

LONDON:

Ahmad, A.
Ahmad, S. A.
Ashford, A. O.
Beach, J. E.
Cox, G
Evans, D. A.
Evans, C. A. J. Culver
Grattan, D. A. P.
Gregory, B. M.
Griffiths, A. V.
Howard, R. W.
Jacques, P. A. (Credit)
Jenkins, O. D.
Jenkins, P. A
Jones, D. I. (Credit)
Macdonald, I
Minson, Miss J. M.
Morgan, T. L. A.
Newing, C. R. (Credit)
Overton, M.
Owen, D. C.
Pittaway, E. M.
Polley, M. J.
Prasad, Y.
Price, C. J.
Rawlins, J. A.
Ray, B. R. (Credit)
Rosser, I. J.
Sherlock, B. C.
Symons, G. B. (Credit)
Thomas, W. B.
Thurston, G.
Tuckett, P. C.
Wiggins, G. S.

DUBLIN:

Barnes, M.
Crowe, J. A.
Crowe, S. D.
Dunne, P. J.
Hanly, S.
Hogan, M.
Lawther, S. McK.
Sheehan, G. T. M.
Ruane, E. J.

LIVERPOOL:

Blackburn, P. W.
Briggs, Miss N. M.
Cartmell, W. B.
Croft, D. C.
Cross, M. H. (Credit)
Hughes, D. A.
Jessop, L. (Credit)
Jones, Ceiriog
Leam, G
Locke, R. D.
Magee, Miss M.
Meredith, F. W.
Monk, Miss M.
Moss, R.
Needham, B.
Schwarz, R. A. J.
Short, M.
Smith, G. S.
Taylor, H. S.
Theobald, L.
Twist, J. C. (Credit)
Wannop, C. C.
Ward, Miss G. H.
Wells, C. F.
Williams, K. T.
Woolfenden, Miss E.

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LEGAL NOTES

COOKED MEATS PREPARED UNDER "CONDITIONS OF FILTH"

At Burnley heavy fines were imposed by the local magistrates following the hearing of 195 summonses brought for contravention of the food and drugs and public health regulations. It was alleged that cooked meats, consisting largely of horse flesh, had been manufactured under "appalling conditions of filth."

Roland Massey, against whom there were 52 summonses, was fined £1,910; his son, Harold Massey (30 summonses), £51; George Massey (32 summonses), £22; Ernest Howarth (37 summonses), £41; and Harry Cunningham (35 summonses), £18.

Among exhibits in court was an old iron bath which was said to have been found three-parts full of brine and meat.

Mr. H. C. Riches, for the prosecution, said that when the premises were visited by Ministry of Food inspectors they noticed an "awful smell" coming from a hut in which were thick cobwebs. They found half a ton of meat, all of which it was alleged was completely unfit for human consumption.

It was stated in evidence for the prosecution that two large pieces were definitely tuberculous, four had come from an animal which had died of septicaemia, and the bath in which they were pickled contained bacilli of dysentery.

Mr. John King Shaw, a veterinary surgeon, who searched the Masseys' premises for the Ministry of Food, said the wooden hut windows were shrouded with sacking and "considerable filth" covering the glass.

There were a large number of cooking utensils of the sort used in a cooked-meat factory, and the majority of these were dirty. The floor was covered to a depth of about six inches in grease and filth, and there were ample cobwebs, and fungi could be seen in many parts of the roof, he said.

He found 53 pieces of meat on the floor and hanging from hooks, apart from meat contained in two boilers and a mincing machine.

The meat on the floor gave the impression that at one time it had been in a coal cellar. It contained considerably more blood than is ordinarily found in butchers' meat.

When he questioned him Roland Massey told him that they delivered meat to 253 separate addresses in 24 different towns, said the witness.

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DEATH FOLLOWING OPERATION FOR RIG CASTRATION
FAILURE OF NEGLIGENCE CLAIM

An action arising out of the death of a horse following an operation performed by a St. Albans veterinary surgeon was heard by Judge J. B. Blagden at St. Albans County Court on Tuesday, October 19th.

His Honour dismissed a claim made by Gerald Tomlin, farmer, of "Parkfield," Nomansland, St. Albans, for damages against Mr. Arthur Shenton, veterinary surgeon, of "Trenburn," St. Bernards Road, St. Albans, on the grounds of alleged negligence.

Mr. H. B. Figg (for plaintiff) said that at the material time Mr. Shenton was in partnership with Mr. Elmes, who had, unfortunately, since died. They were veterinary surgeons practising in the district.

On June 3rd, 1947, Mr. Elmes carried out an operation for rig castration on one of the plaintiff's horses, and Mr. Shenton was there to assist him.

It was admitted that before the operation Mr. Elmes suggested that the horse should be insured. Immediately a request was made to the National Farmers' Union Insurance Company, but the operation was performed before the answer came back. When the answer did arrive it stated that rigs were not insured.

During the operation Mr. Elmes said, "Now keep the horse quiet; give it a little exercise and allow it to go out to graze for a few hours a day so long as there is no other animal in the field." This the plaintiff did.

On Saturday, June 7th, the fourth day after the operation, Mr. Elmes telephoned the plaintiff to say that he was coming to take out the stitches. He duly arrived and removed the stitches at about 11 a.m. to 11.30 a.m.

The plaintiff was about his farm all that morning, and at about 1 o'clock he noticed that the horse had some raw flesh or something red round about the site of the operation. He immediately telephoned Mr. Elmes and the latter arrived at once with Mr. Shenton. By that time, however, the wound had opened up and practically the whole of the intestines had been deposited on the floor. The horse had to be destroyed.

Mr. Figg said it was suggested for the plaintiff that Mr. Elmes had been negligent in taking out the stitches too soon after the operation.

Mr. Tomlin, in the witness box, said that when Mr. Elmes telephoned on the Saturday to say that he was coming to take out the stitches, he (Tomlin) thought it was rather soon, but could not remember whether he actually said so. Mr. Elmes had not seen the horse between the time of the operation and this Saturday.

Plaintiff added that he was very upset by what happened, and what he was complaining about was that the stitches were taken out too soon. Mr. Shenton was not there when the stitches were taken out; it was Mr. Elmes alone.

The Defence

Mr. Shenton, in evidence, said that in June of last year he was in partnership with Mr. George Elmes, who was considerably older than himself. He did not have anything to do with this horse until the operation, when he went to assist Mr. Elmes.

He should say, from memory, that the horse was under anaesthetia for about three-quarters of an hour. Mr. Elmes first tried to find the missing testicle, but he was not successful. He asked witness to feel to see if he could find it. He felt round and found the testicle. The stitches were inserted and the horse gradually came to and stood up.

"I had nothing to do with the horse after that until it was destroyed," added Mr. Shenton, "when I went round with Mr. Elmes in response to a telephone call from the plaintiff. To the best of my knowledge the operation went off perfectly. There was nothing wrong there at all."

In reply to questions, Mr. Shenton said the usual time for removing stitches after this type of operation was the third or fourth day.

Mr. Figg: Removing the stitches after the third or fourth day would, of course, necessarily follow an examination to be sure it was safe to take them out?

Mr. Shenton: One would normally look at the place before removing them, yes.

If you had operated on the horse and had taken out the stitches in the same amount of time, and what has happened here did happen, would not you have thought you had taken the stitches out too early?—No.

Why not?—It is one of the normal risks, and perhaps the greatest risk, one runs with this operation. It is one of the recognised risks.

If there was any chance of the whole of the intestines depositing themselves on the ground under this horse would not you have thought Mr. Elmes would have explained that to Mr. Tomlin?—He might have done, for all I know.

Evidence in support of defendant's case was given by Professor G. H. Wooldridge, Past President of the Royal College of Veterinary Surgeons, who said he had carried out many operations of a similar kind.

Mr. Stenhenson (defending): The operation was at 7.30 p.m. on the Tuesday and at 11.30 a.m. on the following Saturday the stitches were removed: does that indicate to you negligence or unskilfulness?—Witness: Oh no. That is nearly four days. The average period is about three days—between three and four.

Professor Wooldridge said the sooner the stitches could be taken out the better as it tended to reduce certain other risks. In his opinion Mr. Elmes was a very skilled veterinary surgeon.

In giving judgment, His Honour said the only negligence alleged in the case was that of the premature removal of the stitches. He accepted the evidence that the normal time for removing the stitches was three or four days, and the claim must fail with costs for the defendant.

In this case, continued Judge Blagden, a serious charge had been made against a professional gentleman, but he did not take any adverse view of its having been made—it was a natural conclusion for a layman to come to.

His Honour gave judgment for Mr. Shenton on a counter-claim for five guineas, which, it was stated, was the amount of a bill sent in for the operation.

. . . . .

Bequest of "All my Bloodstock."—At a recent hearing, the Court of Appeal—the Master of the Rolls, Lord Justice Somervell, and Lord Justice Evershed—held that a bequest in the will of the late Major Godfrey Anthony Gillson, racehorse owner, who was killed in action in 1944, to his trainer, Mr. Harvey Leader, of "all my bloodstock" included Major Gillson's share in a thoroughbred horse, Pink Flower, although other persons also owned shares in it, because it had been an integral part of his stud.

The Court held, however, that another thoroughbred horse, Colombo, in which Major Gillson, as a member of a syndicate, had owned a fortieth share as an investment for stud purposes, was not included in the bequest.

Mr. Justice Jenkins had held in the Court below that neither horse was included.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreaks.

Swine Fever:

Middlesex.—The Orchard, Oldfield Lane, Greenford, Middlesex (Nov. 12th).

* * * * *

Louping-Ill in Man

In *The Lancet* (September 18th, 1948, p. 453), Drs. George Davison and Charles Neubauer, of the General and City Hospitals, Newcastle-on-Tyne, give detailed accounts of two cases, which on serological examination by Dr. E. Weston Hurst, an authority on the viruses pertaining to the same group, proved to have been caused by the virus of louping-ill. After the discovery by Pool *et al.* (1930) of the virus aetiology of the disease in sheep, workers have not been slow to take up the study of louping-ill virus, particularly in so far as comparative study might throw some light on the important human disease caused by a similar virus, namely, poliomyelitis or infantile paralysis. Soon after the commencement of those studies, cases were recorded of accidental transmission of the louping-ill virus from experimentally infected animals to laboratory workers. The cases reported by Davison and Neubauer, however, refer to natural infection, and inasmuch as many more cases of undetermined fevers with or without accompanying encephalitic symptoms in louping-ill areas may well have arisen and continue to arise from the same cause, the precise symptomatology, which is well described in their article, ought to be borne in mind by our colleagues practising in those areas. "The clinical picture of louping-ill in man," according to Davison and Neubauer, "is probably as variable as that of poliomyelitis. It is now known that the classical picture of paralytic poliomyelitis is one of the less common manifestations of the infection, which is often followed by only a mild non-specific illness with rapid recovery: the same may be true of louping-ill. Nevertheless, recognition of louping-ill will depend primarily on recognition of the cerebral type of illness. . . ."

"A few days after laboratory exposure to the virus, or after tick bite in an endemic area," they continue in attempting to paint a picture of the disease in the light of the limited number of cases so far recognised, "the illness begins with malaise, headache and fever, which continue for about a week. There is then an afebrile interval of one or two weeks, during which the patient gradually recovers and may return to work. The symptoms now return with increased intensity—severe headache with fever, vomiting, brachycardia, drowsiness, insomnia, confusion, and possibly tremors and ataxia. Physical signs are relatively few but may include neck stiffness, papilloedema and cranial-nerve palsies. The fever abates in a few days, and the symptoms have largely cleared in a week, but a few weeks elapse before the patient feels fully recovered. During the second phase the blood shows a mild

leucocytosis of 10,000 to 12,000 per c.mm., with 70 to 80 per cent. neutrophils. Lumbar puncture yields a clear or slightly raised protein content and a pleocytosis of 50 to 500 cells per c.mm., predominantly lymphocytes.

"Variations on this picture so far known are that the illness may be mild, ending with the first phase and without development of meningo-encephalitis; or the first phase may be wanting and the second phase more severe, with widespread cerebral involvement causing tremors, ataxia and pyramidal signs, and leading to permanent sequelae. The cells in the cerebrospinal fluid (C.S.F.) may initially be polymorphs.

"The disease should be suspected whenever meningo-encephalitis develops in a person exposed to the louping-ill virus either in the laboratory or by contact with sheep ticks in one of the endemic areas, especially in the summer. The diagnosis may be confirmed by virus-neutralisation tests properly carried out and interpreted by an expert. A diagnosis might be made by animal inoculation of blood removed at the onset of illness, but it is extremely unlikely that the diagnosis would be considered at that stage. . . ."

"The relationship of louping-ill," Davison and Neubauer further state, "to Russian spring-summer encephalitis remains to be considered. The intensive work on this disease in Russia in 1937-39 has been summarised by Somorodintsev (1944). The illness he describes shows striking resemblances to louping-ill. It is a virus disease transmitted by *Ixodes persulcatus* and is transmissible to monkeys, goats, sheep and mice and other rodents. It is believed that birds and rodents act as a natural reservoir. In man infection produces a severe meningo-encephalitis, with a mortality of 20 to 30 per cent., and frequent residual paralyses. Whereas louping-ill is seen commonly in sheep and uncommonly in man, Russian spring-summer encephalitis is common in man; in each case the mortality is high in the host commonly affected. Russian spring-summer encephalitis differs from louping-ill in the incidence of residual paralyses. Casals and Webster (1943, 1944) have studied the viruses of louping-ill and Russian spring-summer encephalitis in relation to the other viruses which affect the central nervous system. They have found, by complement-fixation, neutralisation and cross-resistance tests on susceptible animals, a very close relationship between the viruses of louping-ill and of Russian spring-summer encephalitis, but no relationship with any other viruses known to affect the central nervous system."

All this is of absorbing topical interest to veterinarians as was plainly manifest by the eager attention paid recently at the N.V.M.A. Congress at Southport, in the course of the discussion on Canine Encephalitis, to accounts of the rapid progress of discovery made in elucidating the phenomenon of plasticity of host-susceptibility and tissue tropisms in connection with another virus, namely that of dog distemper. The anomalies which are becoming increasingly disturbing to the practitioner in dealing with that disease are becoming now explicable in the light of that phenomenon of virus plasticity. To the worker upon the viruses, appreciation of the possibilities is both disturbing and encouraging. It is disturbing in so far as some viruses may undergo considerable changes, in the field and in the laboratory, in their host and tissue affinities, not to mention their antigenic structure, and so come to present perplexing problems in prophylactic immunisation. It is encouraging in so far as exploitation of the phenomenon may lead to the discovery frequently of modified types of virus which can be used safely for the immunisation of the host in which a strain of the same virus is commonly producing lethal effects. This has been known, of course, for some time—indeed ever since Pasteur's modification of the "street virus" of rabies for the purpose, and as was later conspicuously well exploited in discovering an effective immunising agent against cattle plague, and, again, later in the case of South African horse sickness. At the moment many interesting reports are forthcoming upon achievements in the same direction with the virus of Newcastle disease in poultry. What is of grave portent in the information derived from the article under notice is the possibility that louping-ill, which we have hitherto presumed to be a disease—and a severe one—naturally confined to sheep, and limited to certain areas, may become transformed into a disease affecting predominantly mankind. That it has the capacity to attack man has now been well proved. That it may acquire special affinity for man, and cause severe symptoms and a high death-rate, is also, it seems, not only possible but rather too distressingly probable.

The authors make a generous acknowledgment to our colleague, Mr. W. Lyle Stewart, of the Department of Agriculture, King's College, Newcastle-upon-Tyne, the patient in the first of their two cases. They express their indebtedness to him for the clear history of his symptoms and for advice on how diagnosis could be established, and for sources of further information.

J. T. E.

How much to-day we have become a nation enslaved to austerities and frustrations was evident in London when concurrently we had adjoining spectacles of Dairy Show and Motor Show, with no milk to drink or cheese or butter to sample at the former and no cars for sale at the latter. What a tale of woe for the British lion!

—*Farming News.*

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible

Victoria Veterinary Benevolent Fund Christmas Appeal

Sir,—With the approach of Christmas may we crave a small space in *The Veterinary Record* to appeal for donations to our Christmas Fund?

As the name indicates, the money received is fully used as gifts to our recipients to enable them to enjoy that little extra at Christmas to which we all look forward.

Letters received have shown how greatly these gifts have been appreciated, and to what useful purpose they are put.

We appeal, therefore, to members of the profession (or others) to help brighten this Christmastide of our recipients, both young and old, who, through no fault of their own, find themselves in straitened circumstances.

Please send cheques, etc., made payable to the V.V.B. Fund (Christmas Fund), to 10, Red Lion Square, London, W.C.1.

In the past some members have kindly made gifts in kind. If any are desirous of so doing, will they please write to the Hon. Secretary (stating the nature of their gifts), who will be pleased to forward them the name and address of a recipient to whom the gift will be acceptable.

Yours faithfully,

Arnold Spicer, *President.*
J. B. Buxton, *Hon. Treasurer.*
P. J. Simpson, *Hon. Secretary.*

10, Red Lion Square,
London, W.C.1.
November 13th, 1948.

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LONG-CONTINUED LACTATION WITHOUT PREGNANCY

Sir,—The following extract from "The Book of the Farm," by Henry Stephens, F.R.S.E., dated 1889, may prove of interest regarding recent correspondence on "Long-continued Lactation Without Pregnancy." The writer gives several examples of from five to seven years and goes on to say:—

"The same veterinary writer proves fully the possibility of securing permanency of milk in the cow. This is effected by simply spaying the cow at three to four weeks after calving. The operation consists in cutting into the flank and, by introduction of the hand, destroying the ovaries of the womb. The cow must have acquired full stature. . . . She should be at the flush of her milk . . . and be in high health, otherwise the operation may kill her or dry up the milk. The only preparation required for safety is, that the cow should fast twelve or 14 hours before the operation. The wound heals in two to three weeks. For two or three days after the operation the milk may diminish in quantity; but it regains its measure in about a week, and continues at that mark for the remainder of the animal's life, or as long as the age of the animal permits secretion of fluid; unless, for some accidental circumstance—such as attack of severe disease—it is stopped. But even then the animal may easily be fattened."

Examples of the advantages of spaying are then given, etc.

Yours faithfully,

P. G. D. Bowen.

47, Arundel Road,
Littlehampton, Sussex.
November 5th, 1948.

Advertiser's Announcement

'Wellcome' brand Penicillin Intramammary Injection 100,000 units

Burroughs Wellcome & Co., who first introduced the single dose tubes of penicillin for the treatment of bovine streptococcal mastitis announce the addition of a 100,000 unit strength to their range. The new strength is issued in boxes of twelve tubes, price 27s. (subject to professional discount). Price reductions as from November 15th are announced for the 20,000 and 50,000 unit dose tubes, these becoming respectively 12s. and 18s. per box of twelve (subject to discount). Special quantity prices for all strengths are available on application. All tubes of 'Wellcome' brand Penicillin Intramammary Injection contain at the base a pad of soft paraffin which ensures expression of the full dosage without waste (patent pending for this device).